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## CONTENTS.


Editorial Notes ..... 737
The Cripple Creek Report ..... 738
The Engineers' Building ..... 738, 742
Progress on the Rand ..... 738
Colorado School of Mines ..... 738
Market Conditions ..... 739
Metallics ..... 739
Cyanide Reactions ..... *Alfred Chiddey* 740
Electricity vs. Compressed Air ..... *Arthur Winslow* 740
The Geologist in Practical Mining ..... *J. H. Penberthy* 740
*Mine Valuation ..... *T. Lane Carter* 741
The Water-Leyner Drill ..... *J. G. Leyner* 742
The Engineers' Building ..... 742
*Roads for Mines ..... *Jas. W. Abbott* 743
Bounties for Iron Making in Newfoundland ..... 745
Andrew Carnegie on Profit Sharing ..... 745
*The Syncline as a Structural Type ..... *T. A. Rickard* 746
Siloxicon ..... *F. A. J. Fitzgerald* 746
Archeology and Mineralogy ..... 747
*Mining at Mt. Lyell, Tasmania ..... 747
The Whiting System of Hoisting ..... 748
Wire Rod and Wire Nail Production ..... 749
*Carrying the Surface Meridian down a Vertical Shaft— *G. C. McFarlane* 749
Using Powder in Illinois Coal Mines ..... 749
*Electrolytic Zinc Extraction by the Hoepfner Process *E. Guenther* 750
Abstracts of Official Reports ..... 752
Books Received ..... 753
Books Reviewed ..... 753
Recent Decisions ..... 754
Correspondence ..... 755
Questions and Answers ..... 755
Asphalt from Petroleum Residue ..... 755
*United States Patents ..... 756
British Patents ..... 757


* Illustrated.

### DEPARTMENTS


Assessments ..... 770
Chemicals, New York and Foreign ..... 768, 772
Coins, Foreign ..... 769
Dividends ..... 770
Financial Notes ..... 768
Industrial Notes ..... 759
Markets: Coal, United States and Foreign ..... 765
Iron and Steel ..... 766
Metals: Gold, Silver, Copper, Tin, Lead, Spelter, Antimony, Platinum, Quicksilver, etc. ..... 768, 769
Mining News: United States and Foreign ..... 760
Mining Stocks ..... 765
Obituaries ..... 758
Personals ..... 758
Schools, Technical ..... 758
Societies ..... 758
Stock Market Review: United States and London .... 765
Stock Quotations ..... 770, 771
Trade Catalogues ..... 759


WE TAKE PLEASURE in stating that Mr. Chas. G. Yale, of San Francisco, has joined our group of special contributors. Mr. Yale needs no introduction to our readers in the West; for the benefit of those who have never visited the sunny slopes of California, we may add that Mr. Yale for 23 years was editor of our esteemed contemporary, *The Mining and Scientific Press;* he has also been connected with the United States Mint at San Francisco for the past ten years, and is now Special Agent of the United States Geological Survey. Besides these distinctions Mr. Yale has won an esteem among the mining men of California such as no appointment could alone confer.

⚒

WE LEARN THAT Messrs. G. S. Scott and J. W. Holman have joined forces and acquired the *Western Mining World,* of Chicago, which will henceforth be published as *The Mining World.* Mr. L. A. Sisley is managing editor. Both Mr. Scott and Mr. Holman have honorably represented this JOURNAL in former years. We wish them every success in their new enterprise.

This pleasant incident enables us to emphasize again that while the ENGINEERING AND MINING JOURNAL does not intend to form any affiliation with other papers, it wishes good luck to all its younger brothers who are doing good work in furnishing technical knowledge to the industries of the day.

⚒

IN OUR ISSUE of May 2d, we criticised destructively the statements made in a prospectus sent out by the Mexican Mining and Exploration Company, and we did so because the list of directors included so many men of repute that it seemed likely that the inexperienced in mining would be misled, to the injury of legitimate business.

We are informed that several of the directors united in sending Mr. Henry G. Catlin, of New York, to make an inspection of the mining properties to which the prospectus referred, and that this engineer has reported that the statements generally are gross exaggerations. As a consequence, Admiral Schley, Gen. M. C. Butler, Senator John P. Jones, Gen. Frank C. Armstrong and Mr. Cowen have withdrawn the prospectus, pending a thorough exploration of the territory controlled by the company.

⚒

THERE ARE MATTERS, the importance of which, though appreciated well enough by mining men, apparently makes little or no impression on the public at large. The excessive use of powder in coal mining is a good instance. During the anthracite strike of 1900, newspapers had a great deal to say about the poor anthracite miner being cheated by having to pay the operator considerably more than the market price for powder, although it was pointed out at the time in these columns, and elsewhere, that high-priced powder made the miner exercise care in blasting, thus lessening the waste in dust and small coal, and by diminishing the chance of explosions, insuring greater safety to life and property. However, the price was reduced and two years later testimony was offered before the Anthracite Strike Arbitration Commission showing that the reduction in the price had led, as was expected, to an increase in the amount of fine coal produced.

In the State of Illinois, where the United Mine Workers have driven some very good bargains with the operators, the miners have carried wasteful methods to a logical conclusion by blasting coal off the solid, except in machine mines, without undercutting at all. What this means in the matter of dust produced, with resulting danger of life and property, can easily be imagined. Even the mine workers are beginning to realize the seriousness of the evil and, as shown by a correspondent in this issue, they are seeking to lessen it by limiting, through legislative action, the amount of powder to be charged in a hole; and by demanding shot-firers at some mines, so that the miner, at least, may be saved from the consequences of his own greed and carelessness. The coal may be blown to dust, an explosion may wreck the mine, the shot-firer may lose his life, but the miner is going to be safe on surface. This is a beautiful example of some trade-union methods.

⚒

THE STATIST, OF LONDON, publishes a long account of a "looming immense copper supply" near Lake Tanganyika, in Central Africa. It is regrettable that our London contemporary should give serious credit to the statements made in the chief report on the mine, made by Mr. J. R. Farrell, who is referred to as "an expert," and "the American mining expert." He is, we believe, an engineer of ability, but the estimates given of the ore developed are as foolish as those of a tyro. On the basis of innumerable native pits and a few connecting surface workings carried out by an exploring party which has been in the region for scarcely a year, he assumes the existence of an ore-body 1,000 ft. wide, 1,500 ft. long and 100 ft. deep, or about 10,000,000 tons of ore above a 100-ft. level, which is taken as the depth to which this mass can be quarried. Mr. Farrell states that this is "but

one of several ore-bodies" and he adds that his samples warrant an estimated average of 15 per cent copper. The details of these estimates would make interesting reading. They resemble, far too much, the absurdities which have injured legitimate mining in the past. To obtain proper proof of the existence of 10,000,000 tons of ore having a stated average metallic content requires an amount of cross-cutting, sinking and drifting, followed by an elaborate and painstaking sampling such as is not even suggested by the matter which the *Statist* reproduces so cheerfully.

It should be known ere this to those engaged in copper mining in any country, but especially in a new region, that natural processes of secondary enrichment, well understood by qualified men, often bring about a surface showing of rich ore which may extend from a little more than a mere shell of a few feet in thickness to a zone several hundred feet thick, but that in any event until this has been carefully studied by competent men, the prospective value of a copper deposit in a new district is one of the most uncertain things in mining experience.

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### THE CRIPPLE CREEK REPORT.

We take pleasure in publishing a letter, from the editor of our Colorado contemporary, the *Mining Investor*, regarding the attitude of the principal mine owners toward the contemplated supplementary report on the Cripple Creek gold-field. In our issue of May 2 we gave expression to a feeling of disappointment over the intelligence that the arrangement made with a view to a fresh investigation of the district seemed likely to fall through on account of the want of support from the leading mine owners. This information came to us from an official source, and was received by us with regret, as indicated in our comment at that time. The letter states, however, that subscriptions to the fund which is to defray part of the expenses of the supplementary investigation of the district have lately been coming in so much faster that success seems now assured. This is a highly satisfactory outcome; we congratulate Cripple Creek on the assistance which it will receive in its future development by reason of the later geological data to be collected and analyzed by Mr. Waldemar Lingdren and his assistants of the Geological Survey.

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### THE ENGINEERS' BUILDING.

On another page our readers will find the latest news regarding the arrangements made toward carrying out the project for an engineers' headquarters. As regards the American Institute of Mining Engineers, we learn that the Council has appointed a special committee to confer with similar committees of the other organizations concerned and recommend a detailed plan, which will perhaps require to be submitted to the members at large. Among other questions, that of additional expense must, no doubt, be considered. This has been heretofore a serious obstacle to any comprehensive scheme for a consolidated building. Mr. Carnegie's generous gift covers the cost of the building itself, while the ground on which it will be erected is expected to cost about $517,000, which it is proposed to subdivide among the four societies in interest. If the money is raised by issuing 4 per cent bonds, as has been suggested, the annual interest of about $4,500 for each society, would be practically the rent, to which would be added the proportionate expense of maintenance, heat, light, etc.

The removal of the office of the Institute from down-town to Thirty-ninth Street will have both advantages and disadvantages. While it remains within the business area, the library is accessible to engineers whose offices are in that vicinity. On the other hand, the new site will be most convenient to visiting engineers on account of its proximity to the leading hotels and clubs. However, these are small matters compared to the consummation of a friendly fellowship among the leading engineering societies. The new building will be a standing suggestion of the position which the engineering profession has won in modern days, it will inform the people of this city and through them the whole nation, that the engineer is a force in the community, not only as an agent in its industrial development, but as a thinker and a worker who follows fact and shuns the make-believes of the crowd.

One suggestion we venture to make; let it not be a "Union" Engineering Building, which is the name hitherto employed. Let us shun the use of a word of such evil association. Forty years ago the word Union meant patriotism and essential manhood, today it is the slogan of an ignorant tyranny of the most un-American kind. It often represents one of the chief obstacles to the successful carrying out of engineering works. So let it be "The Engineers' Building," or some other simple title which escapes all unpleasant associations and carries with it only the expression of a new solidarity among the engineering professions of America.

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### PROGRESS ON THE RAND.

The output of the Rand in April is reported by the Johannesburg Chamber of Mines at 227,871 ozs. fine gold, against 217,465 ozs. in March. For the corresponding month a year ago, the yield was 119,588 ozs. At Johannesburg the labor question is still paramount, the importation of Chinese is vigorously discussed, and efforts are being made to increase the supply of Kaffirs. It is felt, in spite of the steady influx of the latter and the hope that within a year or eighteen months the number of Kaffirs will reach that attained before the recent war, that the increasing demands of mines now undergoing development is sure to exhaust the supply of African natives, so that assistance must come from a foreign source. In regard to the introduction of Chinese coolie labor, there is much significance in Lord Milner's recent statement that the question would be left entirely to the judgment of the people of the Transvaal.

A matter possibly of great importance to the Rand is the recent strike on "Gembokfontain No. 32," lying to the south of the Randfontein Estate group, and belonging to the Western Rand Estates. This area is entirely over-laid by limestone over a thousand feet in thickness, and consequently it has been impossible to do anything in the way of tracing the outcrop. It has also been more or less generally presumed that since the formation is very much broken at the southern extremity of the Randfontein group, therefore the western limit of the Rand was probably in this neighborhood. Farms situated beyond this point have, as a consequence, been regarded as of small value. The Western Rand Estates, however, which control an area of something like 42,000 acres on which they will probably receive mining rights to say 3,000 claims (each claim 154.95 by 413.2 English feet), had the courage to start boring, and have in their fourth hole just cut a reef which, for a width of 10½ ins. shows an assay value of 7 oz. 18 dwt. This is, certainly, very good, and, after making full allowance for barren ground to be included in stoping, the indicated milling value is still in the neighborhood of 1¼ oz. per ton. These shares have jumped from 28 to better than 80 shillings, and of course the district is now attracting a good deal of attention. The only bad feature is the fact that the limestone renders it impossible to estimate the difficulty that may be encountered in sinking shafts. It is, naturally, more or less cavernous, and these caverns are full of water; in fact, the main water supply of Johannesburg is pumped from this neighborhood. It is to be presumed, however, that these difficulties will be met, and there is reason to believe that, with this new discovery, as well as with several recently made in the Eastern part of the district, the gold-fields of the Rand will be proved to cover a very much larger mining area than the most conservative men have heretofore been willing to concede.

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### THE COLORADO SCHOOL OF MINES.

Among the technical schools organized to train students for mining engineering, the School of Mines at Golden, in Colorado, has had the misfortune during recent years to suffer several disturbances which have made it the subject of comment in the press to an injurious extent. It is one of the State institutions of Colorado, and as a local school of technology it has earned a creditable name for turning out well-prepared graduates. During the past month the School was again the scene of an unfortunate disruption, the faculty has resigned and with it the president, Prof. Charles S. Palmer, who was appointed to the position only a year ago.

This JOURNAL takes a keen interest in the welfare of the mining schools, for as the direction of a stream is fixed to a large extent by the place of its source, so does the engineer get his first fundamental impulses from the training received when his character has not yet put on the stubbornness developed by the buffetings of his competitive career. Therefore, there is no excuse needed for referring to the misfortunes of the School of Mines in Colorado. The present trouble is but the sequel to that of 1901, when there was a strike of the students against the faculty, and its president, Prof. Regis Chauvenet. The trustees foolishly listened to the unruly young men, the local papers published interviews with them, an unseemly and wholly absurd situation was developed, such as the Trustees were ill-suited to control. As a rule, the men appointed as trustees by the Governors of Colorado are not distinguished for educational attainments or for particular knowledge of mining and metallurgical matters. Occasionally a distinguished professional man happens to be chosen, but he serves mainly as a contrast for the ordinary political accidents and local notorieties who get appointed by Governors, some of whom are themselves men of no parts. Governor Orman, for example, appointed the late W. S. Stratton, a carpenter who got rich by accident, a well-meaning man, wholly unfitted by want of education and manners, to be in such a responsible position. When the students struck, Mr. Stratton sided with them and this only complicated matters.

The last catalogue issued by the School of Mines shows that in the seventeen years between 1883 and

1902, there were graduated 224 men, or not quite 14 per annum, the highest year's work being in 1901, when 37 graduates were turned out, and the lowest in 1890, when a solitary pupil represented the output of the institution and the State appropriation of $40,000. It is complained that it has long been the policy of the faculty to fill up the School with freshmen, thus getting numbers and an appearance of prosperity, then to pluck them freely until finally a mere handful of unusually bright students were graduated, thereby enhancing the value of the diploma, while concurrently spoiling the career of a large number of good men who were compelled to resume their training elsewhere or break off unfinished. The faculty endeavored "to keep up the standard of the school," as the phrase went, but even in this they failed, for the individual members of that faculty rarely had any standing as authorities on the subjects which they taught, they were essentially mediocre men unlikely to inspire youth to great achievement. When Prof. Chauvenet, a distinguished chemist and a man of parts, was finally compelled, owing to dissensions with the faculty and with the blundering trustees, to resign his position as president, the board elected Prof. Charles S. Palmer, who at that time was at the University of Colorado at Boulder; this choice met with general approval, and Prof. Palmer started work with the good wishes of the best element in the community. He tried to change some of the rules, so as to give the students a chance to make up conditions, and he introduced other changes calculated to bring the school into line with modern methods. This precipitated a fight over that fetish, "the standard of the school," the faculty resigned, and, in order not to hamper the trustees in making new arrangements, Prof. Palmer did so also. So the trustees are now seeking for a new president, and the latter is to select his own faculty. The gentleman on whom the honor will fall has our sympathy, for so long as the trail of the political serpent is over it all, there will be no peace for the chief of the School of Mines at Golden, Colorado.

It is obvious that a great mining empire like the State of Colorado ought to have a good School of Mines, entirely divorced from political influences, and then, but not till then, supported by the influential body of mining engineers and metallurgists to whom Colorado is a home and a field of profitable activity. When politics are finally eliminated, we do not doubt that a broader sentiment will lead to the recognition of the fact that to have the State Agricultural College at Greeley, the State University at Boulder, the State Medical College at Denver, the State School of Mines at Golden and other State scholastic institutions the Lord knows where, is, in the aggregate, a standing absurdity which a petty regard for considerations of real-estate values and political exigencies can alone explain. When that time comes, instead of having three or four professors for each subject distributed among the several unimportant and scattered colleges, it will be possible to get and to hold men of the highest rank as instructors and to build up a solidarity and an *esprit de corps* such as marks those institutions which are to-day powerful forces in the industrial development of this country. Let a great University of Colorado, with its school of mines, medical college and law school, rise upon the ramparts of the mountains and face the dawn, as the University of California at Berkeley stands at the gateway of the Pacific.

## MARKET CONDITIONS.

The metal markets are still comparatively quiet, although the strong position of copper to which we referred in our last issue is beginning to make itself felt.

Copper shows somewhat more strength, although the market continues rather quiet, and sales have not been large. Sellers are inclined to be firm in view of the strength of the position and are not pressing metal forward. In fact, as we noted last week, there is very little spot copper for sale and most of the producers have their output contracted for up to the end of June. The London market is much firmer, and there has been a sharp rise in standard copper; at the same time it must be remembered that conditions in Europe are still somewhat uncertain, but the consumers are beginning to realize that they will probably have to pay a higher price for what metal they need.

Tin has been comparatively quiet, with few changes in price. While the metal continues to be in rather a speculative condition, spot stocks are being gradually worked down, and the current demand will keep the market fairly steady, unless there should be new arrivals of large quantities, which is not expected.

Lead continues unchanged in price, with the usual consumptive demand. There has been some talk lately of a revival of the plan for consolidating the principal consumers into one company. No new facts have developed in the case, however, and there seems to be small probability of this combination being completed for some time to come.

Spelter remains strong, both galvanizers and brass makers being good purchasers for their current requirements. The metal is not being pressed for sale, however, and spot supplies do not appear to be over plentiful. In the Joplin ore market the smelters have again endeavored to cut the price of ore and buyers have been offering $1 per ton less than for some time past. Offers were made in fact on the basis of $35 per ton for 60 per cent ore. This action has been rather resented by the producers and there has been a tendency to hold back supplies. The quantity marketed last week was nearly 700 tons less than in the previous week, and it is said that the ore-bins are pretty well cleaned up.

Silver continues rather strong on the surface. The speculative interest in London has acted on the probability of short supplies of future metal—a conclusion which seems hardly warranted by facts. However, this interest has succeeded in squeezing the bears in the metal and in maintaining the price at rather a high level. They were aided during the past week by the fact that large purchases were made in London by brokers who are commonly understood to act for the India Council, and it is generally believed that considerable purchases are being made for Indian coinage. Our own Treasury Department made the usual purchase this week, 310,000 oz., for Philippine coinage, the average price paid being 54½ cents, delivered at the Mint.

The iron market continues rather quiet. Buyers of pig iron and steel billets are still inclined to pursue a waiting policy, in the hope of securing concessions from the furnaces. These have not been granted as yet, although it seems quite possible that the Southern furnaces may yield the point which has been pressed upon them for some weeks past and grant another dollar per ton to Western buyers, thus putting them on the same level as the Eastern trade was placed a few weeks ago. In finished material, the large purchases of plates and bars, which were recently noted, seem to be about over, and comparatively little is being done at present. For structural steel, however, the demand continues very good as the building season progresses, although the numerous strikes have had a somewhat depressing effect.

The Western coal markets are quiet and steady. Local supplies are good. The coal is being hurried forward to the Ohio ports for shipment to the Northwest. The Lake trade is still somewhat unsettled, as shippers and vessel-owners have been unable to agree upon the season rates and bids are being made on rather a wild basis. A number of ore-boats now coming in from Lake Superior have furnished an abundant supply of tonnage for Duluth and the upper ports, however, and the principal trouble seems to be over rates to Chicago, Milwaukee and Green Bay.

The Atlantic Seaboard bituminous trade continues quiet and dull. Receipts at tidewater are sufficient for all current needs, and there is little prospect of any immediate improvement in the market, though coastwise shipments will doubtless pick up as soon as vessel freights fall.

In the anthracite trade the demand continues strong and widespread and now that labor troubles at the mines are being adjusted a heavy tonnage is going forward. The output for April was restricted by strikes, and the May production promises to be much larger.

## METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The great water wheel at Laxey in the Isle of Man, which was said to be the largest in existence, is soon to be put out of service. This wheel drained the great Laxey mines, but with increasing depth and flow of water it has been found insufficient, and is to be replaced by steam pumps. The wheel, which has long been a point visited by tourists, will probably be allowed to stand. It is 72 ft. in diameter and its force was estimated at 200 horse-power.

Experiments made in Elba with lignite in by-product coke-ovens have resulted in the manufacture of a very fair quality of coke with the recovery of a large proportion of ammonia liquor and tar, besides a fair supply of gas. The result was rather unexpected, as there has been a strong prejudice against this lignite for metallurgical purposes.

In recent discussions on the subject, English engineers seem to object to the use of machines in coal mining on account of the great increase in the number of shots required to bring out the coal. The complaint is made that the coal is broken up too much. This seems strange, as the result in this country has been practically the reverse.

The picture which is said to attract most attention in Paris Salon of this year is called "La Mine," and shows miners at work in the galleries of a coal mine. Singularly enough, this picture, which is said to be very complete in every detail and powerful in its general effect, was painted by a girl, a young student. Another picture which attracted much attention shows miners just leaving the pit.

In this country we do not pay much attention to royal and official visits, but in France it is otherwise, for the French papers seem to anticipate a great improvement in the sale of English coal in France as a result of King Edward's visit to the country.

## DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

### CYANIDE REACTIONS.

*The Editor:*

Sir.—Referring to the recent discussion, in your JOURNAL, of the action of lead acetate on the sump solutions employed in the cyanide process, I desire herewith to submit the results of experiments recently made by me on an analogous subject, namely, the action of potassium cyanide on silver sulphide in presence of lead oxide.

Three lots of a 10 per cent solution of silver nitrate were precipitated with sodium sulphide and the precipitates washed.

To the first was added 80 c.c. of a 0.25 per cent cyanide solution and allowed to digest for 12 hours on filter.

To the second was added 80 c.c. of a 0.25 cyanide solution and 5 c.c. of a 10 per cent NaHO solution and allowed to digest for the same time.

To the third was added 80 c.c. of a 0.25 cyanide solution and 5 c.c. of a 10 per cent NaHO solution, to which had previously been added 2 c.c. of 10 per cent lead acetate solution, and allowed to digest for same time.

At the end of that time the amount of silver in solution was determined.

The first contained 0.0082 gram., the second 0.003, and the third 0.027, that is, 6.35, 2, and 21.2 per cent, respectively.

The action of caustic soda in the second case in preventing solution is not very clear to me, but in the third case I presume that the lead oxide in solution directly decomposed the silver sulphide, but, be that as it may, it largely increased the amount of silver dissolved in a given time.

This action has a very important bearing on the treatment of tailings by cyanide, when they contain a fair quantity of silver. I have been using lead acetate in my pumps for some time past, with very favorable results, causing the silver extraction to rise from 50 to 80 per cent.

I am aware that the use of lead acetate in the sumps has already been recommended by Mr. Alfred James and others, but I am not aware that the direct decomposing influence of an alkaline solution of lead on silver sulphide has yet been pointd out.

ALFRED CHIDDEY.

Mina de El Transito, Amapala, Honduras,
March 21, 1903.

### ELECTRICITY VS. COMPRESSED AIR.

*The Editor:*

SIR:—I have read with interest the articles in recent issues of the JOURNAL on this subject. If Mr. Saunders had extended his visits in the West to Telluride, Colo., he might have found one small electric mining equipment at the Liberty Bell Mine. Unfortunately, however, I cannot say that it has been in "constant commercial operation."

We have installed at our Stilwell tunnel a small electric drill plant consisting of a motor-generator set of about 7 h.p., sufficient to run two large-sized electric drills of the so-called "slugger type," as well as a blower for ventilating purposes. This plant has been installed for about a year and one-half and we have managed to advance the tunnel, which is 7 x 8 ft. in section, a distance of about 700 ft. The drills principally used have been the Durkee and Gardner, both of the flexible shaft and separate motor type. A short test run was also made with the self-contained Locke drill. The Box drill of the Denver Engineering Works has not been used in the tunnel. These drills have been run at times by, and under the supervision of. men furnished by the manufacturers, at other times by skilled air drill men or by picked crews with special supervision.

The results of our operations, as a whole, have not been satisfactory and under no conditions have we been able to obtain constant and regular services with either of the drills. With men who are not perfectly familiar with the machine, the progress made is slow and there are constant interruptions on account of ignorance in handling as well as by reason of frequent breakages. With the best qualified men, breakages of the parts are still frequent and the attention of a skilled mechanic, familiar with the details and requirements of the drill, and the facilities of a machine shop are necessary in order to keep work going with even moderate constancy; in addition a large stock of extra parts has to be kept on hand. Our tunnel is at an elevation of between 10,000 and 11,000 ft. We have no air-compressor plant and all of our power is supplied through our electric power line. There is undoubtedly great economy in power with electric drills under such conditions over what would be necessary with air drills, the former requiring directly, possibly, as little as one-tenth of the latter. Such conditions as ours would seem the best possible for favorable results with electric drills and it was on this account that the plant was installed. Nevertheless, were we facing the situation anew, with the benefit of our past experience, I should recommend installing an air compressor plant, notwithstanding the much larger initial cost and the very much greater power charge. In other words, the efficiency of the electric plant, when considered in the larger sense alluded to by Mr. Saunders, is, in my opinion, much less than that of an air plant, even under our favorable conditions.

We have clung to the electric plant so long as we have with the hope that we might be able to overcome the difficulties, but one test after another under varying conditions has yielded disappointing results. With the many recommendations which can be legitimately claimed for a simple electric drill, there is reason for the belief that the electric drill will be the drill of the future, but our conclusion is that before it can be generally accepted it must be simplified, and there must be a period of education gone through whereby a sufficient corps of men may be educated to handle such drills. No mine or other enterprise can afford to let its operations be dependent upon the services of a few men.

If the electric drill manufacturers wish to bring about the early introduction of their machines, it seems to me that they must investigate the situation more carefully, so as to provide the necessary remedies. It is not sufficient for them to put up a block of granite in their works and to run the machine there, at their own plant, for a short time, to demonstrate its capabilities. They should send out their drills with competent men to run them, not for a period of 30 or 60 days, but continuously until a special work may have been completed. By this means they will have opportunity to learn the actual difficulties of practice as well as the weaknesses of their special drill. These can be ascertained in no other way. They should at the same time do all they can to educate men generally in the use of these drills, and they should further make such offers to, and arrangements with, mine operators that the latter will be induced to try the drills under these conditions. The expenses of trying new machinery to the operator are always high, even without considering (what is the most important item) the interruption to regular work. The manufacturers should make such propositions to the operators that these costs and losses will be, in some measure, offset, such expense of education and introduction to be charged, and properly so, to the cost of getting the drills on to the market.

I offer these remarks, quite disinterestedly, as the conclusions of actual experience. They may be of some value to others using or contemplating the use of power drills. I am much interested in the development of the electric drill and trust that our experience may be of some little help in furthering their improvement.

ARTHUR WINSLOW,
Gen. Mgr. Liberty Bell Gold Mining Co.

Kansas City, Mo., May 9, 1903.

### THE GEOLOGIST IN PRACTICAL MINING.

*The Editor:*

Sir.—In your issue of May 9 I read the letter of Mr. Lindgren, of Washington, concerning the relation of geology to practical mining, and if you will permit me, I would like to say a word. Mr. Lindgren speaks of the Cornish mine captains as excellent men, who, "as a class, lack that foundation of science which is so absolutely indispensable to the mining engineer." As it is a poor rule which does not work both ways, is it not fair to say that the expert geologists are intelligent men, but that as a class they have not got that foundation of practical acquaintance with mining which is so absolutely indispensable when you are underground? Now, Mr. Editor, I am not much in the scientific line, and I have a great respect for the Government geologists, but my experience underground, as miner, foreman and superintendent, has shown me that you can no more size up the habits of a vein by reading books and walking over the surface than you can learn to catch pilchards by staying on shore and reading about the habits of fishes. There is a kind of knowledge, Sir, that can only be got with the dirt and candle-grease on a man's overalls, that is, by watching the ways of veins, the ins and outs of the pay-streaks in the stopes and the manner in which the ore "makes" and "peters out." The structure of the formation must be congenial to the formation of mineral, and the rock must be keenly to become impregnated with pay-ore. I remember, Sir, when the boys who owned the Last Chance Mine, at Grass Valley, California, explained to Prof. Jenks that their lode was split at the bottom of the shaft, and the Professor told them to go on sinking to 400 ft., and then to cross-cut both ways so as to cut the two branches and that they would then have two lodes. Old Capt. Harris spoke up and said: "Damn it to 'ell, Professor, do you know what I think about that mine?" and Jenks, says he, "What do you think, Captain?" and the Captain he answers: "I think you will be too deep in your mine." Capt. Harris was right; what was the use of two veins if they were small, and was there any advantage in having two pay-streaks, each of them half the size of the main pay-streak, so that you had to stope so much more ground and drive that many more feet of drifts and cross-cuts?

Mr. Editor, I have knocked around quite a bit in our Western mining camps, and I never knew of a geologist who discovered a mine. When the mine has been found and the ore-body opened up, the professors come along and tell us where it is and how it got there; but when one of them tries to run a mine, they get off the pay-streak in no time, and then they start cross-cuts every-which-way to find the ore. Of course, they make elegant maps and they give the rocks the right names; the maps are all right, and when I was in Leadville leasing on the Iron Silver Mine, I used to look over Prof. Emmons' maps like a sea captain off a foreign shore, and those maps of Leadville were worth lots of money to me in locating the breaks in the formation and the position of the contacts. Regarding the names of rocks, I suppose "monzonite" and "quartz andesite" are more accurate than "porphyry," but if the ore followed the contact of the porphyry and the lime, it does not help a miner to find the ore any better if he calls the "porphyry," monzonite, and the lime, Carboniferous. The main thing was to know the porphyry from the quartzite, and the lime from the dolomite. "Where the ore is, there it is," the main thing is to keep it in sight and to follow it, instead of driving expensive cross-cuts and vertical shafts that cost lots of money, and all sorts of finely-timbered levels that only end in losing the ore. I tell you, Mr. Editor, my folks worked for tin in the old country, and we were always told when we got onto pay-ore to stay with it, and I can't see why that is not better than a geological inquest after the ore has been lost by too much geology and too little mining.

When all is said and done, Mr. Editor, I want to know what the geologist can tell us about the places where we can find pay-ore. Seems to me he is like

the fellow with the dowsing rod, he can tell us where there is ore, but he don't know whether it will pay to work it; to him $2 stuff is much like $20 rock. What *we* want is mineral that will give us a dividend at the end of the month. Of course, it is well enough to sit down and smoke a pipe and talk about the origin of the tin and the copper and the gold, arguments are lively, and it comes as keenly to the miner to discuss these points as it is for the womenfolk to talk about their frocks; but, say I, what we want to know, is not where the tin or gold used to be and where it came from, but where it is *now* and where the *biggest* body of it is likely to be found. I have been reading all about your secondary enrichment, and mighty interesting stuff it is; some of it is all right, and I take a good deal of stock in the gray-copper theory, for I used to work in Butte and I have seen the gray copper on the top of the pyrites—there was no mistake about that. Now, if the experts will just get on that tack and tell us where these secondary enrichments are—where we can cross-cut for them or sink to them—then, Sir, I shall be the first to take off my hat to them. But, until then, the geological professor should not give us mining captains the turn down; by prospecting we find the ore when it comes to surface, and we stay with it so long as it lasts; the geologist gentleman does not find it, and when he is put on to it, he loses it. So I would change Prof. Lindgren's remark and say that "the necessity for a practical foundation in the education of a mining geologist should be universally recognized."

JOHN H. PENBERTHY.

Houghton, Mich., May 12, 1903.

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## MINE VALUATION.

*The Editor:*

Sir.—In reading the papers on "Sampling and Estimation of Ore in a Mine," it has occurred to me that a few remarks on South African practice may prove of interest to your readers, and in submitting them I am encouraged by Mr. Rickard's reference to the influence of the Rand on gold mining practice, to believe that American engineers are keenly appreciative of methods used in the Transvaal.

No two gold-fields are exactly the same. To a certain extent, each is a law unto itself. General rules must be supplemented by a thorough knowledge of local conditions. The importance of sampling varies considerably in different localities. For instance, suppose there is a huge deposit of low-grade material which must be quarried from a mountain. In such a case there may be little opportunity for selection. On the other hand, if you have to deal with gold-bearing deposits, such as those of the Witwatersrand beds, then sampling becomes of vital importance. In some districts sampling may be considered a desirable luxury; here it is an absolute necessity.

It has always been recognized on the Rand that sampling was of the utmost importance, but the mistake was made at first of imagining that any one could sample efficiently. An applicant who professed ignorance of all mining matters was looked upon as a proper man for a sampler. All this is changed now. Whereas one inefficient man was once considered sufficient for sampling, many of the big properties now employ at least two good men, who give their entire time to the sampling of the underground workings, and the keeping of the records. Experience has shown that this pays well.

As is well known, before milling commences on a Transvaal gold mine, big ore reserves are blocked out, as much as 350,000 tons being usually developed by the time the stamps commence to drop. For a short period after the shafts first cut the reefs, the samples are generally assayed on an adjoining mine, or in the town. When the samples become numerous, the mine opens its own assay office. Sometimes in the development stage of a mine one man is employed to do the assaying and sampling, but it is considered better to keep the assay and sampling department separate. More often a man is engaged to do the sampling and surveying. As the mine opens out more men are required, and when in full swing a property of 200 stamps employs a surveyor and assistant, an assayer and assistant, and a sampler and assistant. These six men are responsible for the mine valuation.

Before the war a fashionable way of developing a mine was to run what are known as intermediate drifts parallel with the main levels. In Fig. 1 a sketch of an intermediate drift is given. These drifts are started off east and west from the raise; and at intervals of 35 ft. or so, as at A, A, box holes are blown through to the main levels. Not only was

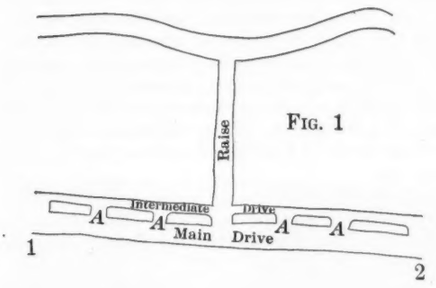


FIG. 1

the main level carefully sampled, but the intermediate drift as well. The height of the intermediate drift was made one-half that of the level. Individual samples vary considerably, but over a long distance, as from 1 to 2, the average value comes

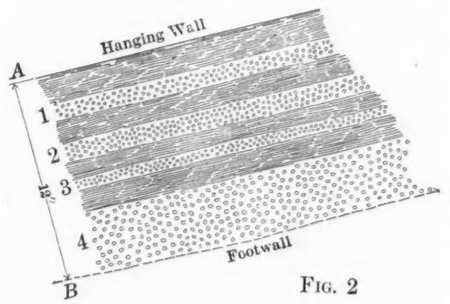


FIG. 2

out about the same. I am glad to say that the practice of running these intermediate drifts is dying out, for they are needlessly expensive.

During the development stage of a mine a frequent method of procedure is to sample the faces

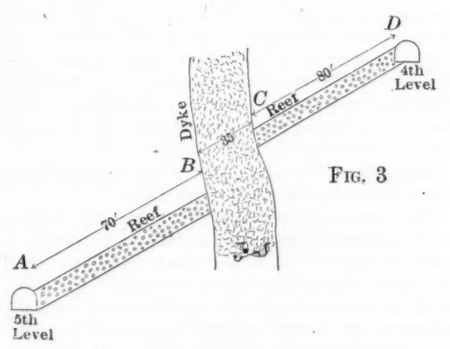


FIG. 3

of the drifts after each blasting operation. This means an interval of about 5 ft., which is considered a fair distance between samples. The advantage of sampling the mine in this manner is that the assay will show whether the miner is keeping on the rich seam or "leader." The disadvantages are that, as a rule, the drift at the face is nearly choked up with broken ore, so that only one section can be obtained, and that the sampler is necessarily hurried by the miner, who objects to the delay caused by him. The same method is pursued in winzes and raises, samples being taken after every "round."

Mr. Rickard gives an instance of three samples being taken across a vein 12 ft. wide. On the Rand, a sample over such a big width would not be taken, but the 12 ft. would be divided off into sections of 2 ft., and each section sampled separately. Look at Fig. 2, and you will understand why samples of sections are taken. In this example four distinct samples would be taken, one from each of the stringers, as it is of the utmost importance to find where the gold lies. Suppose stringer No. 1 persistently assayed 2 to 3 dwts., or much below the limit of pay-ore; then it would probably be decided to leave this stringer in the hanging wall, and narrow up the stope. No matter if the stringers are thick or very thin, they are invariably sampled separately. On some mines, the waste rock found between the stringers is also sampled and assayed, but it is really only necessary to take occasional samples of this waste, as it seldom contains gold in payable quantity.

Let us suppose that there is an unbroken mass of auriferous material from A to B, 12 ft. wide, and that even below B there is still reef. Even in this case, according to Rand practice, the face would be divided into sections of 18 to 24 ins., and each would be sampled and assayed separately. For an ordinary drift showing unparted reef, the face is divided into three sections, namely, "Hanging Wall," "Middle" and "Foot-wall," and each section is sampled separately.

Thousands of tons of material on the Main Reef, which is the bulky producer of the banket series, are being left in the mines. As a rule, this material is too poor to be worked under present industrial conditions, but there are payable patches in it, and in the future more attention will be paid to the sampling of this material. An ideal way to test it is to use a diamond drill, and get cores at regular intervals from the stuff which is left below the foot-wall. In fact, it is likely that the diamond drill will become an important auxiliary in mine sampling.

In sampling drifts, winzes and raises, it is found of considerable advantage for the sampler to make use of the surveyor's mine stations, for by so doing the exact position of each sample in the mine is determined.

On some parts of the Rand, where the reef is only an inch thick, but very rich, it is a common practice to measure off equal distances on both top and bottom of the reef, and take the sample over this width. If proper care is taken to get the right proportion of country rock in the sample, this method is a good one for small rich leaders. Of course, the calculation is made for a width embracing the waste rock sampled, together with the reef.

Some years ago panning was very popular on the Rand, but it has gone out of vogue of late. On account of the pyritic character of the matrix, and the fact that much of the gold is "bound," panning can never be relied on for accurate determination on these fields, but as a rough test it is excellent. Panning serves three purposes. First, in a large mine that is being developed, where hundreds of samples are assayed each month, it is a check on the assayer's work. Then, panning gives a close approximation of the amount of pyrite in the sample, so that the assayer can decide whether there is need for a preliminary treatment for sulphur, such as roasting, etc. Lastly, in an office where hundreds of samples are being assayed in the course of mine valuation, I believe it would save money, if the samples were divided, according to the results from panning, into rich and poor. The samples high in gold could be assayed by the scorification method, while the crucible would be used for the poor ores. I know some people decry the scorification assay, and demand a "pot assay" for every sample, but with proper care I find the scorification assay satisfactory for rich ore.

The grouping together of all the assay values is entrusted to the surveyor, who, of course, is also responsible for the determination of the ore reserves. The assay plan contains the values of the samples taken in the mine, and it is this plan that the surveyor uses in estimating the reserves. Assay plans are made on one of three different planes,

namely, the horizontal, the vertical, and the plane of the reef; the one which is best adapted for the purpose will depend upon the dip of the reef.

It is when the mill starts crushing and gold returns are reported, that the mine valuation is finally tested. I must admit that it is somewhat discouraging to review the past history of the Rand, and notice the difference between what was promised before the mill started, and what was actually obtained when the battery commenced to work. If there was a constant in the discrepancy it would be a simple matter to apply it to future determinations, but the results are too contradictory.

On one mine it was found that the returns from the reduction works were 70 per cent of what the assay plan called for. On a neighboring mine this factor was subsequently employed. When the mill commenced crushing, however, much to the delight of every one, it was found that a pennyweight more gold per ton was extracted than was promised by the estimates.

This goes to prove that the value obtained after sampling is not a mathematically correct figure, and that an engineer cannot always guarantee that the mine will give what the sampling calls for. In spite of such occasional discouraging results sampling on the Rand is looked upon with more favor than ever, and with extended local experience the work of estimation is certain to be better done.

From what has been said, it must not be thought that the work of the sampler is over, or lessened, when the mill commences crushing. At all stages the sampler is necessary. After mining begins he watches the stopes most carefully to see that no payable material is left in the workings. From the stope samples taken throughout the month, the value per ton of what the mill should return for that month is worked out. Every day a "lip sample" is also sent up from the mill. As inside amalgamation is now almost entirely omitted, only a spoonful of mercury being fed into the boxes every hour, with proper care a very accurate sample of the ore being crushed is given by the "lip sample."

I am glad to see that Mr. Rickard condemns the "grab" sample so emphatically. Better not sample at all than adopt this haphazard method. The only place here where the "grab" sample is employed is in testing the waste rock leaving the sorting house.

Space will not allow me to enter into the discussion of ore reserves. The expression, "ore in sight," which appears to be causing so much discussion among American engineers, is seldom used out here at all. "Tons of ore developed" is employed, and care is taken to give the number of tons developed on each separate reef. As Mr. Philip Argall, in his suggestive contribution, has pointed out, that engineer should go into detail, and give a precise statement as to the condition of the "ore in reserve." Almost invariably on the Rand the number of tons of ore in reserve are underestimated, due to too small a stoping width being assumed in the calculation. The question of stoping width is a very important one, for if it is wrongly assumed, not only is the tonnage too small, but the assay-value over the stoping width is made too high. At one time the stoping width was arrived at in the office, but now the custom is to examine every block of ground and work out carefully what the actual stoping width will be.

On those mines which have the misfortune to be cut up by dikes, the management is at considerable disadvantage as regards ore development. Fig. 3 will illustrate a case. The dike cuts in two the block of ground developed by the 4th and 5th levels. Ordinarily the calculation for reserves would be made for backs from A to D. The general Rand practice is to only consider the backs from A to B, in working out reserves. From C to D is not considered developed ground at all.

On most mines the amount of ground developed each month is usually at least as much as the tonnage mined during that month. Unfortunately just now, on account of the scarcity of labor, it is found difficult to maintain a parity.

Johannesburg, April 4, 1903. T. Lane Carter.

THE WATER LEYNER DRILL.

*The Editor:*

Sir:—In an editorial in the Journal of March 28th under the caption "Dust in Mines" you took occasion to make some very disparaging comments regarding our Water Leyner Drill.

You spoke of the experiments at Hell Gate as successful applications of the principle used in our Water Leyner system. As a matter of fact, neither the principle nor the mechanism used by us were made use of there. Our system involves the use of water under air-pressure, not flowing through a hollow rod by force of gravity. In our system compressed air is the agent used to eject the cuttings. We use the water merely to lay the dust and to assist the air in its ejection of the cuttings. There can certainly be no comparison between this method, or principle, as you term it, and the discharge of water through a hollow rod merely to make the cuttings of a consistency which will better enable the churning action of a percussion drill to force the cuttings out.

In your editorial you say "It is an old device, and has been adopted more recently in the Leyner machine, which employs a hollow drill head, 18 in. long at the end of a steel pipe."

The device, as you call it, is not old. Neither do we employ in or about our Water Leyner Drill a hollow drill-head such as you mention.

Your editorial further says, "This use of water is helpful in overhead holes and in shattered ground, although it may weaken the drill itself when employed in attacking very hard rock. As a means of introducing water it has the drawback, therefore, of limiting the scope of the drilling machines, and it is not likely to be generally adopted."

There is so much of manifest ignorance in your editorial and so manifest a disposition to discredit our drill that we are wholly at a loss to understand your motive in its publication.

Why should your editorial writer go out of his way to say "it *may* weaken the drill itself when employed in attacking very hard rock"? And when he has himself, in this premise, merely said "*may* weaken," what justice can there be in his drawing for himself the positive conclusion that "it *has* the drawback, therefore, of limiting the scope of the drilling machines."

Not even content with this manifestly unwarranted conclusion, your editor sees fit to prophesy that our drill "is not likely to be generally adopted."

For your information we desire to say to you that for several years past we have been mailing your office catalogues and all other printed matter issued by us descriptive of our drills. In such literature our machine is plainly described and illustrated. We have mailed you reports of various contests and comparative tests of our Water Drill against rock drills of the ordinary reciprocating type, in which mine operators of unquestioned standing have certified to the exact opposite of the statements made and conclusions drawn in your editorial.

The writer of your editorial, therefore, can hardly plead justifiable ignorance of the facts.

The patent office of the United States has granted us numerous patents upon the mechanical designs of our drill and an independent patent upon the method or system. The issue of these patents has been chronicled in your own columns and ignorance of their allowance can hardly be pleaded to justify your statement that "the device is an old one."

It was our original intention to pass the article unnoticed, but our attention has been called to it by so many mine operators who have been impressed by its manifest bias, prejudice and injustice that we are moved to make this reply.

While we are advertisers in the Journal and were the more astonished upon this account at the publication of your editorial, our protest against its absolute unfairness and its entire inaccuracy is not made upon this ground, but upon the broad plane of the right of any inventor and manufacturer to be correctly represented in a technical journal making the claims and pretensions which The Engineering and Mining Journal does to the consideration of its readers.

We ask for this protest the same prominence in the next issue of the Journal which you gave to the editorial.

The J. Geo. Leyner Engineering Works Co.,
By J. Geo. Leyner, President.

Denver, May 5, 1903.

[The above letter is published as a matter of courtesy. We beg to point out that the editorial referred to did *not* "prophesy that the Leyner drill is not likely to be generally adopted," but it did say that the method of introducing water for the particular purpose of laying the dust caused by drilling is not likely to be adopted. Our other comments would have called for rejoinder if Mr. Leyner had not, to our regret, so evidently misunderstood our motive in discussing the matter in connection with dust in mines.—Editor.]

## THE ENGINEERS' BUILDING.

On the evening of May 7, in accordance with invitations, the boards of directors of the several bodies interested, as well as some other members of the different societies, held an informal meeting at the house of the American Society of Civil Engineers, to consider the gift of $1,000,000 from Mr. Carnegie for the Engineers' building. Sixty-five gentlemen were present, including Presidents A. Noble, of the Civil Engineers; Dr. A. R. Ledoux, of the Mining Engineers; J. M. Dodge, of the Mechanical Engineers; C. F. Scott, of the Electrical Engineers, and J. C. Kafer, of the Engineers' Club. The meeting organized with the election of Mr. Noble as chairman, and Mr. T. C. Martin as secretary.

A very free, frank and open discussion of the subject, its advantages and its possible objections, was had, lasting about three hours.

The president of the American Society of Mechanical Engineers, Mr. James Mapes Dodge, reported that at a meeting of their Council in the afternoon, the formal resolution proposed in the letter of W. A. Redding, May 1, had been adopted, and a committee appointed comprising Prof. F. R. Hutton, C. Wallace Hunt and himself. This committee is to act first as a conference committee, and is authorized to make such changes in harmony with the spirit of the resolution adopted as may be deemed advisable upon conference with the committees of the other bodies. The same committee is to be retained as a permanent committee.

The president of the American Institute of Electrical Engineers stated that the board of directors had indorsed the resolution proposed by Mr. Redding, and had appointed a conference committee, comprising Mr. Calvin W. Rice, Mr. T. C. Martin and himself, with instructions to report back a definite form of resolution which should be adopted. He further stated that it was expected by the board that final action would be taken on May 19, as there was a board meeting, and also an annual meeting of the Institute on that day.

The president, Dr. A. R. Ledoux, and the secretary, Dr. R. W. Raymond, of the American Institute of Mining Engineers, stated that their institute would have a board meeting on the following day. Both of the gentlemen, however, were in hearty accord with the plan, and said that they considered it not a question of whether they should come in, but of the best ways and means of doing so. Later it was announced that Messrs. A. R. Ledoux, Charles Kirchhoff and Theodore Dwight had been appointed delegates.

The American Society of Civil Engineers will probably have a board meeting within the coming week. One of the past-presidents, Mr. George S. Morison, stated that as they already had a building the conditions were different with their society; but after giving the matter careful consideration he was of the opinion, speaking for himself, that the relations which they should sustain to the general engineering interests were such that, leaving aside

their own individual preferences, the Society should join with the others.

Representatives of the Engineers' Club expressed hearty accord with the general scheme. Mr. Kafer stated that delegates to the conference would be appointed at the meeting of officers on May 11.

Resolutions were adopted without a dissenting vote, expressing appreciation and thanks to Mr. Carnegie for the generous offer which he has made, and a cablegram of gratitude to him for his offer, drafted by Mr. Morison, was adopted and sent.

It was agreed that the conference committee, consisting of three representatives from each of the five bodies, should be called to determine upon the next steps, and the next action by the several bodies, at the call of Mr. Scott.

Mr. Kafer stated during the evening that Mr. Carnegie had also undertaken to finance the land for the societies, and that interest at 4 per cent on the land investment would not be asked by Mr. Carnegie until the building itself was finished. Mr. Carnegie's financial agent, Mr. R. A. Franks, had already paid out for them $50,000 in options on the properties on Thirty-third Street, which now represented a buying price of $517,000.

The cable message sent was as follows:

"ANDREW CARNEGIE,

"Iron and Steel Institute, London:

"Members of engineering societies and the Engineers' Club, informally assembled, send this message of gratitude for your generous offer.

"T. C. MARTIN, Secretary."

The resolutions adopted at the meeting are as follows:

"At an informal meeting held on the evening of May 6, 1903, at the house of the American Society of Civil Engineers, attended by members of the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the Engineers' Club of New York City, it was:

"*Resolved*, 1, That those present hereby signify their profound appreciation of the recent action of Mr. Andrew Carnegie in donating to the cause of engineering, and in recognition of the engineering profession, the sum of $1,000,000 for the erection of a Union Engineering Building; and also for otherwise making it possible to accept and utilize this sum by his liberal, unencumbered and prompt co-operation in financing a suitable site.

"2. That it is their firm belief that the result of this initiative will be potent for good, and of far-reaching usefulness, greatly increasing the effectiveness of the enginering profession, both technically and socially, and with corresponding benefits to the industrial arts and the world at large.

"3. That they hereby tender to Mr. Andrew Carnegie their gratitude for his generous offer."

We may add that, since the conference was held, Messrs. John C. Kafer, W. H. Fletcher and W. A. Redding have been appointed conference delegates, to represent the Engineers' Club.

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IRON PRODUCTION IN GERMANY.—The German Iron & Steel Union reports that the production of the German blast-furnaces in March was 8,[illegible]224 metric tons of pig iron; showing an increase of 108,965 tons over that of February, and an increase of 161,875 tons over that reported in March, 1902. For the three months ending March 31 the production was as follows, in metric tons:

| | 1902. Tons. | % | 1903. Tons. | % | | Changes. Tons. |
|---|---|---|---|---|---|---|
| Foundry iron | 402,251 | 21.0 | 429,436 | 18.2 | I. | 27,185 |
| Forge iron | 307,439 | 16.0 | 221,669 | 9.4 | I. | 119,009 |
| Steel pig | | | 204,779 | 8.7 | | |
| Bessemer pig | 94,716 | 5.0 | 86,901 | 3.7 | D. | 7,815 |
| Thom. (bas.) pig | 1,112,329 | 58.0 | 1,417,182 | 60.0 | I. | 304,853 |
| Totals | 1,916,735 | 100.0 | 2,359,967 | 100.0 | I. | 443,232 |

The total increase shown this year was 23.1 per cent. The principal gain was in basic pig. Under the new classification, adopted by the Association at the beginning of this year, steel pig includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys; these were formerly put with forge and other irons.

## ROADS FOR MINES.

BY JAMES W. ABBOTT.*

Where wagon freights are a factor in the cost of mining operations economy in this item can only be obtained by constructing and maintaining the necessary roads. It is the purpose of this paper to cover briefly the essential points in this branch of the engineer's practice.

*Location.*—He should first ride or walk several times over the ground between the termini, using his aneroid freely and trying to get the main features of the situation comprehensively into his mind. As a rule, he will encounter some difficult problems, and in considering them haste may lead to waste, the inconceivably vast sums worse than squandered on railroad locations subsequently abandoned being vividly suggestive in this connection. Perhaps, owing to the topography, nature may seem to have fixed certain points through which the road must positively run. If it appears clear that the line can

DEEP CUT SHOWING BAD LOCATION.

be properly located through these points they should be accepted; at least, provisionally. If selecting them involves a sacrifice of other conditions necessary to proper location then the problem becomes seriously complicated, and before satisfactory adjustment is reached may require very radical changes from all plans covering the line so far considered.

If the wagon road is to be eventually replaced by a railroad then the principles involved in railroad location must apply. If it is important that the integrity of the wagon road shall be maintained after a railroad is built that point should be kept in mind and a location secured to avoid, so far as possible, a probable conflict. Of course, no definite relation can be determined between an actual wagon road and a railroad not yet located, but by care it may be possible to limit the damage from the encroachment of a future railroad. Very many fairly good wagon roads have been virtually destroyed by railroad grades to the very serious damage of mines which they were built to serve.

On the mining premises the roads should avoid interference with probable dumps, buildings, or other mining development, while approaches to loading and unloading points should be as nearly level as possible.

Tracks of water-spouts and other occasional waterways should be noted, and liberal provision made for the water to pass through culverts or under bridges, remembering the tendency of sudden mountain torrents to carry stuff which will be certain to choke up too small an opening. In a region where much snow falls the best location for a road is on a hillside facing the east or south, where it will receive the most benefit from the sun. Thoroughcuts and the bottoms of gulches should be avoided. They always quickly fill with snow and are the last places to dry out after wet weather.

Note carefully where snowslides are likely to occur. Where a road must cross the path of a snowslide it should be kept up high enough so that the accumulation of logs, ice, rocks and snow will run over and rest below it. On Alpine roads there is usually constructed in dangerous places a steeply sloping roof over which the slide passes, thus protecting them against this hazard of snow regions. By cutting sufficiently into the bank where a road crosses the well-known track of a slide such a sheltering roof need not be an expensive affair. The adoption of a practice which would decrease the casualties that occur every winter in our Western mountains is certainly desirable.

*Grade.*—There should be no adverse grade on the descending course. By maintaining a continuous fall in that direction the difference in altitude is better distributed and it insures an easier haul both ways. The steepest place on the road determines the up-load. A 12 per cent maximum can always be secured, and should never be exceeded. Only as a last resort should there be any grade above 8 per cent, and that for the shortest possible distance. On an 8 per cent grade four animals, all one driver should handle, will ordinarily haul all the up-freight with the equipment required to handle the ore going down, while if an accident happens on the descent the driver can save himself and his outfit. As a rule, it is unprofitable, and it is always unsafe to freight with wagons on a road where the maximum grade exceeds 12 per cent. Of course, where the difference in altitude when properly distributed, will admit of a lighter grade than 8 per cent the engineer will take advantage of that fact and locate accordingly, but he will not generally be warranted in largely increasing the cost of his road to secure a lower maximum than 8, and he cannot be excused for exceeding 8 per cent if that can be secured by sufficient effort. An exhaustive study of freighting rates and conditions has satisfied the writer that there are very few mines which could get a lower bid for their freighting because of a lighter grade than 8 per cent maximum. Above that, if they have a large business, there will be a very slight increase for maximum grades up to 12 per cent, while for grades beyond 12 per cent rates soar rapidly.

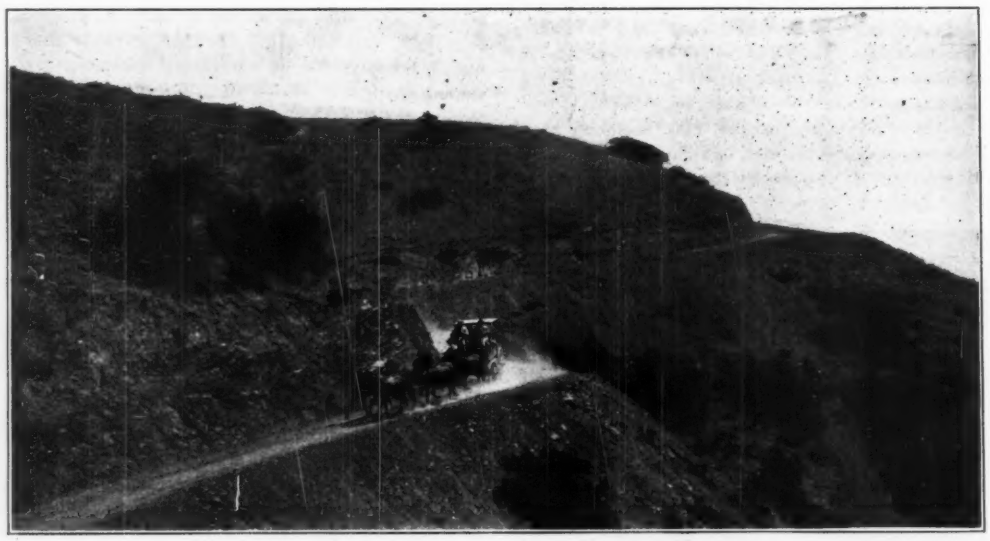
If there are any streams in the line the engineer should note in his reconnaissance where these can best be crossed. Bridges are costly to build and expensive to maintain. There should be as few as is compatible with good location. Where possible, the approaches to these should be straight and where this is impracticable they should be broad, the curves easy and the ends of the bridges flaring.

When there is much hard rock on the line faithful and persistent study is indispensable to get a location which shall be economical as well as practicable.

The principles of railroad location are essentially different from those of mine roads. Long tangents, light grades and easy curves are the desiderata for railroads. They are secured by raised embankments in the low places, and cuts through the higher ones. On a wagon road such embankments and cuts are both to be avoided. There is no necessity whatever for tangents and curves with a 30-ft. radius are admissible. On a level street 60 ft. wide from gutter to gutter a skillful driver with a jerk line will turn a 10-mule team with lead and trail wagons. The leaders move in a curve which has an approximately 30-ft. radius, while the wheelers and pointers do most of the pulling. On a mountain road the necessity for such sharp curves arises only at switchbacks, where in order to overcome a rapid change of elevation it

* Special Agent of Mountain Division, Bureau of Public Roads, United States Department of Agriculture.

is necessary for the road to turn back on a line nearly parallel to itself. Switchbacks are admissible only when necessary to secure a definite maximum grade. A switchback should be perfectly level, and its approaches from either direction for a distance of at least 30 ft. should be level or very nearly so. This is to enable the driver to exercise full control over his team, and so that if necessary the wheel animals can pull most of the load, the situation resembling that of a team and wagon turning around on a 60-ft. street. The conditions are similar on all sharp



STAGE ROAD, SANTA CATALINA ISLAND, CALIFORNIA.

curves, and hence the importance of making the grades, both on the curves themselves and their approaches, very light. Where the engineer has decided that a switchback must be put in he should try to find a place for it where it can be constructed with least expense. There is often an approximately flat spot on the hillside, and the engineer should look for one and try to adopt it for his switchback, even if he is compelled to make several trials before he obtains a satisfactory line. The engineer should try faithfully, first, to avoid a switchback altogether, and, second, if that proves impracticable, then to locate it where it will be least objectionable.

Ordinarily slide rock of any size does not present a difficulty on account of which an engineer need deflect his line at much cost, but if a tangled mass of large boulders is encountered the situation must be examined with great care. This usually means that huge masses of rock break off periodically from cliffs above and go bounding down the steep mountain side. It is a condition sometimes involving so great a menace to men and teams that the place where it occurs must be avoided.

*Staking Out the Line.*—This can always be done rapidly and satisfactorily with a transit and a target rod. The telescope of the transit should be set at the angle of elevation corresponding to the grade desired. The effect will be to ease the grade with any curve in the line, the sharper the curve the easier the grade obtained by this method, which is just the result desired. At each new setting of the transit the rod should be brought up and the target reset at the height of the instrument, so that the bottom of the rod will always be grade. The stakes can be put in as often as desired, the distances apart being estimated by the eye or paced by the rodman. Where for any reason it is necessary to determine a certain amount of cut or fill it can be done with reference to the top of the stake, and the stake marked accordingly, but otherwise the stakes will enter the ground at grade, which on the hillside means the place where the cut into the bank begins. On an approximately flat place it is convenient to have the stakes mark the center line.

Many engineers locate a wagon road as they would a railroad, using a level and a chain to set grade stakes. This is a waste of time, as the other method insures all the precision required, and is much more rapid. If at every transit point the angle of deflection be determined and the distance to the next transit point measured with a stadia rod and an occasional tie obtained to some known point the road is located closely enough for platting and every other practical purpose.

It is well to set slope stakes for the upper, or inside of the road, which mark the points to which cutting must extend in both soft ground and rock. These slope stakes can be set as accurately as necessary with an Abney level, graduated rod and tape line.

*Details of Construction.*—The width of the road must be determined by the amount of travel which it is to serve and the money available for its construction. The proper width for double track is 16 ft. Light rigs, which are under much closer control than heavily loaded teams, can get along very well with 14 ft., but for roads built for heavy freighting in both directions the passing places should be 16 ft. wide. Roads for mines are rarely double track throughout, but turnouts should be constructed often enough for safety and comfort. It is an inflexible rule that from any turnout the entire road between it and the next turnout should be visible. Turnouts should be not less than 75 ft. long, and the distance between any two consecutive ones should not exceed 200 ft.

On many roads for mines the single track is only 8 ft. wide. It ought to be at least 10 ft. wide where the road is straight and widened on curves. Animals when pulling very hard are always liable to sway to either side of the wheel-tracks, and on curves the leaders must have considerable latitude if they are to pull at all. Wherever the road is too narrow this necessary freedom of movement is restricted.

*Shape of the Roadbed.*—If it were not for the action of surface water we should make the cross-section of every road level. In practice we must shape them so as to remove the water from rain and melting snow as quickly and with as little damage to the roadbed as possible. Where the road follows practically the natural lay of the land we raise it somewhat above the ground adjoining, making the center the highest part, so that the water will drain from it to either side. The amount of this rise from either side to the center, called the crown, depends upon the material constituting the road surface. The harder and firmer this surface the less crown is required. When first shaping such a dirt road a crown of 1 in. in 1 ft. should be given. This will rapidly wear down as the roadbed consolidates under travel. A thoroughly settled gravel or stone covered road needs a crown of about 0.5 in. to 1 ft.

On hillside grades running crosswise of the natural rise of the ground we do not put in a crown and drain the water to either side, but we slope the road surface towards the inside bank, making and maintaining a gutter discharging at frequent intervals into culverts crossing the roadbed diagonally. This inside slope to the roadbed is to counteract the constant tendency of the drainage from the hill to fill the inside and cut out the outside of the grade, making wagons slue outward and sometimes constituting a serious hazard, especially in freezing weather. The engineer should make careful provision for drainage on all parts of his road, but most particularly on the hillsides.

In constructing a sidehill grade, part of the roadbed will often be made on the original formation, and the balance will be built out of the material cut away. In figuring for such grades there is no such problem of balancing cuts and fills as the railroad engineer is called upon to solve, where material taken from a cut sometimes has to be hauled for a considerable distance and used for an embankment. In making the mountain road the stuff which comes off from the inside bank is dumped over the outside until the road reaches the desired width.

A WELL-BUILT SWITCHBACK, SAN MIGUEL D'ALLENDE, MEXICO.

As a rule, in soft ground the inside bank should have a batter of 1 to 1, or 45°, while in rock 1 horizontal to 4 vertical is needed to clear projecting loads. Nearly any material encountered in mountain work may be figured to stand with an outside slope of 40°.

Where ground requires no powder one can estimate within quite close limits how much bank will be made by the material obtained from a certain

TABLE I.

| Original side hill slope. Degrees. | BC = 10 feet. AB Feet. | AC Feet. | Excavation per 100 ft. of road. Cu. yds. | BC = 8 feet. AB Feet. | AC Feet. | Excavation per 100 ft. of road. Cu. yds. | BC = 5 feet. AB Feet. | AC Feet. | Excavation per 100 ft. of road. Cu. yds. |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 9.86 | 19.86 | 17.60 | 7.89 | 15.89 | 11.26 | 4.93 | 9.93 | 4.40 |
| 10 | 9.78 | 19.78 | 39.88 | 7.83 | 15.83 | 25.33 | 4.89 | 9.89 | 9.97 |
| 15 | 9.66 | 19.66 | 67.84 | 7.72 | 15.72 | 43.41 | 4.83 | 9.83 | 16.96 |
| 20 | 9.40 | 19.40 | 105.32 | 7.52 | 15.52 | 67.41 | 4.70 | 9.70 | 26.33 |
| 25 | 9.12 | 19.12 | 161.64 | 7.29 | 15.29 | 103.41 | 4.56 | 9.56 | 40.41 |
| 30 | 8.60 | 18.60 | 252.76 | 6.87 | 14.87 | 161.78 | 4.30 | 9.30 | 63.19 |
| 35 | 7.42 | 17.42 | 432.24 | 5.94 | 13.94 | 276.59 | 3.71 | 8.71 | 108.08 |

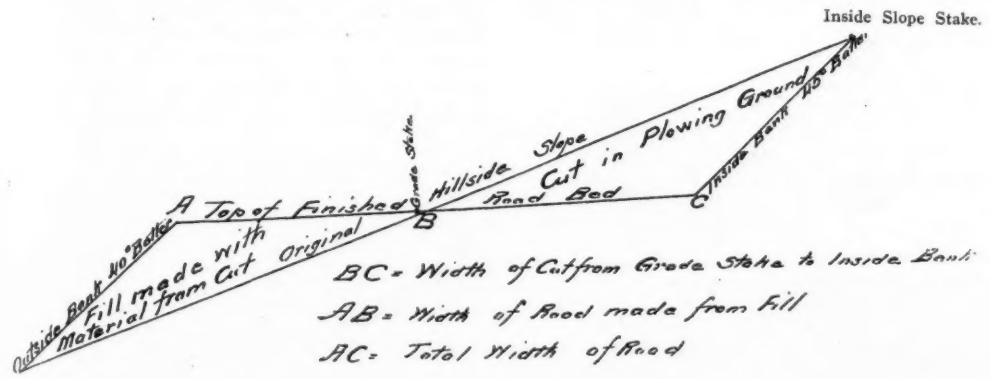

Inside Slope Stake.
Hillside Slope
Cut in Plowing Ground
Road Bed
Inside Bank 10° Batter
A Top of Finished Grade Stake
Outside Bank 10° Batter
Fill made with Material from Cut Original
BC = Width of Cut from Grade Stake to Inside Bank
AB = Width of Road made from fill
AC = Total Width of Road

TABLE II.

*Excavation per 100 Ft. of Road.*

| Original side hill slope. Degrees. | AB=15 ft. Cu. yds. | AB=10 ft. Cu. yds. | AB=5 ft. Cu. yds. |
|---|---|---|---|
| 5 | 36.67 | 16.30 | 4.07 |
| 10 | 76.66 | 34.07 | 8.52 |
| 15 | 120.00 | 53.33 | 13.33 |
| 20 | 166.66 | 74.07 | 18.52 |
| 25 | 220.00 | 97.78 | 24.45 |
| 30 | 281.68 | 125.19 | 31.30 |
| 35 | 353.34 | 157.04 | 39.26 |
| 40 | 441.67 | 196.30 | 49.07 |

depth of cut. If powder must be used some of the material will be blown to such a distance beyond the bank as to be unavailable for construction. This can be partially but never fully controlled by skill in putting in the shots. The bulk of such broken rock as can be utilized will be found to have increased from 35 to 60 per cent above that in place.

Great caution must be exercised in constructing a fill on a hard rock slope, which is very liable to be slippery and offer insufficient frictional resistance to sliding. Where any such danger is apprehended a shelf must be cut out for the bottom of the fill to rest on.

The accompanying tables are of value, especially in preliminary estimates of the amount of material in cuts and fills for a road grade.

Table I is calculated for soft material, with an inside slope of 45°, and an outside slope of 40°. No account is taken of change of bulk. The first effect will be a slight increase. After the ground has thoroughly settled the difference either way from the original bulk will be so slight that it may be disregarded. Amounts of excavation for widths of cut other than those given in the table may be quickly figured by remembering that such amounts vary as the squares of those widths. With any particular slope the relation between width of cut and width of fill is constant for all widths.

Table II is calculated for excavations in hard rock with an outside slope of 1-4. For other widths of cut than those given interpolations may be made as in Table I.

*(To be continued.)*

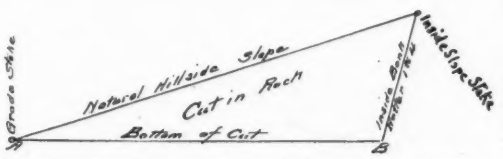
## BOUNTIES FOR IRON-MAKING IN NEWFOUNDLAND.

In order to attract the attention of capitalists to the mineral resources of Newfoundland a bill has been introduced in the Legislature by Premier Bond to provide for bounties on iron and steel made in that colony. The following is the text of the bill:

The Governor-in-Council may authorize the payment of the following bounties on pig iron, puddled iron bars and steel billets made in Newfoundland.

1. A bounty of $1.50 per ton on pig iron made in Newfoundland from ore, fuel and flux the products of Newfoundland.

2. A bounty of $1 per ton on pig iron made in Newfoundland from ore and flux the products of Newfoundland.




3. A bounty of $1 per ton on puddled iron bars manufactured from pig iron made in Newfoundland from Newfoundland ore.

4. A bounty of $1 per ton on steel billets manufactured in Newfoundland from pig iron (made in Newfoundland from Newfoundland ore) and such other ingredients as are necessary and usual in the manufacture of steel billets, the proportion of such ingredients to be regulated by order of the Governor-in-Council. Provided that in computing the bounty no payment shall be made with respect to foreign ores or metal produced therefrom used in the products herein mentioned.

Bounties are to continue till 1910, but there will be a reduction for each fiscal year from July 1, 1905, as follows: For the year ending June 30, 1906, the bounties will be 95 per cent of the amounts above given; for the following year, 75 per cent; for the next year, 55 per cent; for the next, 35 per cent; and for the final year (to June 30, 1910), 20 per cent.

Power is given to the Governor-in-Council to make all necessary regulations for the payment of the bounties.

## ANDREW CARNEGIE ON PROFIT SHARING.*

The most convincing proof of the steady march of labor to a recompense based more and more upon profits, and in forms drawing capital and labor into the peaceful bonds of mutuality, is to be credited to the United States Steel Company, the largest of all industrial corporations, and for which it deserves unstinted praise, as proving a genuine interest in the workmen and sagacious thought for its own. To this step I invite your earnest attention, for it may well prove of surpassing importance and mark an epoch in the history of the relations of capital and labor. It may even be looked back to as having furnished the solid foundation for the solution of most of the troublesome questions between them.

It is in this form: Twenty-five thousand of the $100 shares of preferred 7 per cent stock was offered to its 168,000 employees at $82.50 per $100 share, in different amounts, according to their earnings, which were subscribed for twice over; nearly one-sixth of the men subscribed—one-half being salaried men. Twenty thousand more shares of stock were afterward provided, making 45,000 in all, worth about $4,500,000. Monthly payments are received. Another distribution of shares is intended next year.

One valuable and praiseworthy feature is that for five years those holding their shares and still in the service are given a yearly bonus of $5 upon their shares, and during a second five-year term a bonus, amount not yet fixed, is promised. The third feature, equally praiseworthy, is the resolve to set apart yearly from earnings, should these exceed $80,000,000, 1 per cent of the earnings, and for each $10,000,000 of earnings an additional one-fifth of 1 per cent for a fund to be awarded to such of their officials and men as have in the opinion of the Finance Committee best deserved it, as a reward of merit and not pro rata.

It will be noted that the investment is at the risk of the men. This seems a feature which we may, however, expect the corporation to change as experience is gained, as the plan is most wisely stated to be subject to future changes. In most of the States of the Union, labor's precious earnings, surely the most precious of all capital, are a first charge upon property, and this I believe the only safe policy to follow. "Every workman a shareholder" would end most of the conflicts which sadden us, between capital and labor. To effect this, every corporation could well afford to offer to distribute part of its shares among the saving workmen, and in case of disaster give preference to repayment of principal as a first charge. Any desired legislation with proper safeguards could be readily obtained authorizing corporations to make savings of employees up to a certain sum for each a preferred claim, ranking before mortgage or ordinary debts or the claims of shareholders, akin to the mechanics' lien and the homestead exemption laws. This seems due to the working man, who, necessarily unacquainted with business, takes his shares upon trust and becomes the beneficiary or the victim of his employers. He should be considered as an inexperienced youth in the affair; besides, he is asked to invest not solely for his own, but at least equally for the advantage of his employer. His adviser is not a disinterested party and therefore cannot be absolved from responsibility, which would, I am confident, lead the owners of the United States Steel Company to save their trusting workmen from loss through following their advice, intended to promote the mutual advantage of the company and the workers. The responsibility is not small, since the circular assures the workmen they are offered "a safer and more profitable investment than the workman could possibly find for his savings elsewhere." Much better, therefore, that legal form be given to the moral claim.

There is another point of view, the influence upon the prudent workman of distracting anxiety in regard to the absolute safety of what may be his sole provision for old age. He will see every morning the Stock Exchange quotations, for the American workman reads the papers. Only recently he would have seen the preferred stock of the United States Steel Company temporarily quoted lower than the price charged for it to him. This may mean little to the man of affairs familiar with the ups and downs of the mercurial Stock Exchange. But what must be the effect upon the uninformed workman? Of this I am well assured: the workman whose thoughts are upon the speculative surprises of the exchange will not prove desirable. Speculation is the parasite of business, feeding upon values, creating none, and is wholly incompatible with the satisfactory performance of other regular work requiring constant care and caution. The workman's investment should never be at risk, for if his thoughts are upon the Stock Exchange they cannot be upon the machinery, and machinery, like art, is a jealous mistress, brooking no rival claimant to its absorbing demands. In the interest of the employer, therefore, as well as that of the workman, the savings of the latter should be secure—here, as in other respects, their interest is mutual, and hence I believe the needed change will be made by the Steel Company in the near future. I cannot speak too highly of this experiment nor give the Steel Company too much credit for making it, since it is declared to be in the experimental stage, and subject to future improvements, as all new schemes should be.

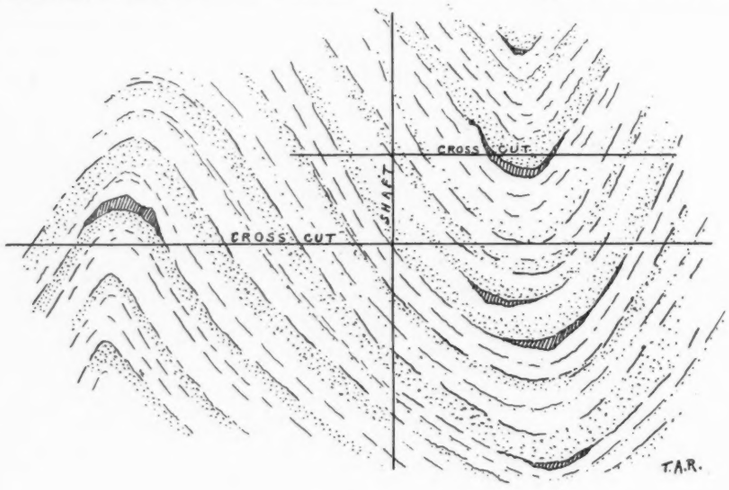
* Extract from Mr. Carnegie's inaugural address as President of the Iron and Steel Institute of Great Britain.

## THE SYNCLINE AS A STRUCTURAL TYPE.

By T. A. RICKARD.

Among the structural types into which ore deposits sub-divide themselves, the syncline has received but scant attention, chiefly because it does not happen to be associated with occurrences of ore having great economic importance. Nevertheless, synclinal bodies of ore form a distinct class, and on that account, if no other, they merit consideration.

The best illustrations of synclines or "inverted saddles" are found at Bendigo, Australia. In some instances they have been found sufficiently gold-bearing to be worthy of exploitation.




INVERTED SADDLES

FIG. 1.

In the Great Britain Mine, such synclines have been worked upon a "line of reef" which is complementary to the anticlinal axis of the New Chum line. In the accompanying sketch, Fig. 1, made in 1890, the structure is shown at its simplest. Other occurrences of this kind were found in the Confidence Extended, and in the Hercules and Energetic mines. Rudimentary inverted saddles are shown in Figs. 2 and 3. In both cases the sandstone is very hard, and is threaded with veinlets of quartz. Along the curve of the parting, between the two beds, there is a narrow width of crushed rock and black clay, in which lenticles of quartz are found. In Fig. 4 another example is given.

At Bendigo the mine managers evince but little desire to follow a synclinal body of quartz because experience has taught them that the inverted saddles are rarely rich enough to be profitably worked; nevertheless, in three or four cases they have been stoped with success. It is safe to say, however, that as compared to the frequent distribution of gold-bearing quartz along the anticlinal axes the amount encountered by cross-cuts which have exposed the synclinal folds is very small. This in itself is a testimony to the importance of rock structure as determining the deposition of ore, because the same beds of sandstone and slate persist from one fold to another, and if the composition of them had been the main factor in causing the formation of ore-bodies, then ore would have been found along the synclinal as well as along the neighboring anticline. In many cases a rich saddle reef is only 150 ft. east or west from the nearest corresponding syncline.

Writing in 1893, I gave the explanation of the poverty, in quartz and gold, of the inverted saddles in these words: "By the mechanical principle of the arch the anticlinal structure tends to preserve a passage for mineral solutions, while on the contrary the basin or trough formed by the synclinal arrangement of the beds, tends by the action of gravity to become closed. It is not probable that the apex of the anticlines was marked by an open way; but we are justified in supposing that along the anticlinal axes there were portions of rock more loose and more permeable than the country surrounding them."[1]

Since the above was written, Prof. Van Hise has discussed the facts as set forth in my description of the Bendigo District, and he has suggested[2] that the pitch of the anticlinal arches has tended to concentrate the ascending ore-bearing solutions below the impervious strata, thereby producing the localization of the gold. This is a reasonable explanation. However, in the typical saddle reef a stratum of hard sandstone usually forms the under limit or foot-wall of the gold-bearing quartz, which, as a rule, is found within the overlying slate, with slate also above it. The question which was the more pervious stratum is obscured by the fact that the passage of the underground waters was probably not through the body of the rock, but along lines of fracture. Of these there was one set indicated now by the dikes which followed breaks along the anticlinal axes, and another set, so multiple in character as to form bands of sheering in the more yielding slate. There is the evident suggestion that in the adjustment of the strata under a condition of lateral compression the sandstone was pushed bodily against the more pliant slate, crushing the latter and forming layers of crushed rock along the contact; and that this continued until a limit to the tenacity of the entire series of strata was reached and the back of them was broken, with the formation of fractures along the anticlinal axes. Underground evidence in the mines, does, I think, corroborate such a view. The slate is frequently crushed and streaked with quartz, the latter having, as it were, healed the former lines of rupture. On the other hand, the sandstone did not yield along the bedding planes, but when it did fracture, the cracks were across the bedding planes and formed the "makes of spurs" or stockwerk of non-persistent quartz veins characteristic of certain Bendigo mines.[3]

When a series of strata are folded there is a tendency to spread apart at the apex of the folds and to press together along the sides.[4] The troughs would, it seems to me, tend to close up by reason of gravity, while the tops of the saddles would be kept loose by the over-arching of individual beds, so that a possible line of water circulation could become established with a resulting benefitiation in the form of gold ore. This is illustrated in Fig. 5, which represents the folds in the Lias near Bourg D'Oisans in the department of the Isere, France, as sketched by me in 1891. If under such structural conditions, a further plication took place to the point of rupture, and a dike found its way along a break which followed the anticlinal axis,[5] then there would be established that connection with vulcanism and thermal agencies, such as is believed by the writer to be the mainspring of those complicated processes of mineral transference which culminate in the deposition of ore within the horizon penetrated by mine workings.

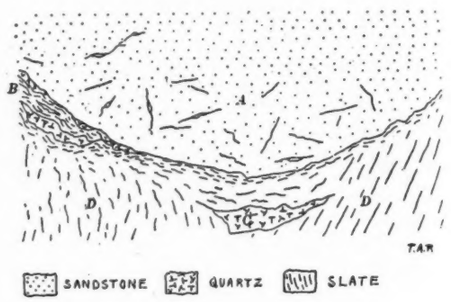



FIG. 2.

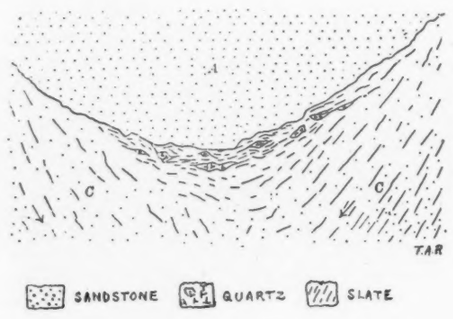



FIG. 3.

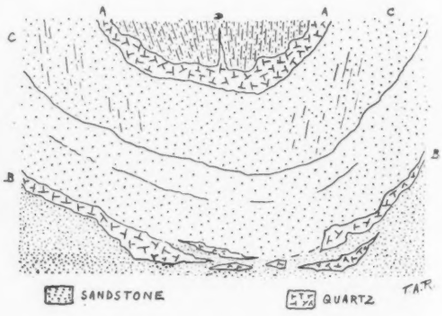



FIG. 4.

## SILOXICON.

By F. A. J. FITZGERALD.

Siloxicon is the trade name of a new compound that promises to be very valuable in metallurgical structures as a refractory material. It is composed of silicon, carbon and oxygen. It seems to contain various oxygen compounds of carbon and silicon, whose formulas vary from $Si_2C_2O$ to $Si_2C_7O$. $Si_2C_2O$ may be considered typical of the new substance, and is formed according to the following equation:

$$2\,SiO_2 + 5\,C = Si_2C_2O + 3\,CO.$$

Siloxicon is made in a furnace somewhat similar to that used in the manufacture of carborundum, but it is much larger and the temperature at which it is worked is lower. The furnace is about 30 ft. long, 9 ft. wide and 5 ft. high, and has mul-

[1] *Transactions*, American Institute of Mining Engineers, vol. xxii, p. 319.
[2] "The Genesis of Ore Deposits," p. 407.
[3] The Bendigo Gold-Field (Second Paper): "Ore Deposits other than Saddles:" by T. A. Rickard. *Transactions* American Institute of Mining Engineers, vol. xxi, pp. 686-712.
[4] See also ENGINEERING AND MINING JOURNAL, March 29, 1902.
[5] As is frequently observed at Bendigo.

tiple cores, whereas the carborundum furnace has a single core. The furnace is filled with a mixture of sand and coke, to which a certain amount of sawdust is added in order to secure the necessary porosity to allow of free escape of the carbon monoxide gas. Through the center of the mixture pass two or more large flat cores of granular carbon, the cores being so proportioned that they give a very great radiating surface. The temperature of the cores is adjusted so as not to go to such a high temperature as to reach the point of decomposition, according to the following equation:

$$Si_2C_2O = SiC + Si + CO.$$

Siloxicon is of a gray-green color, has a density of about 2.75, is unoxidizable, infusible, neutral, insoluble in molten metals and unaffected by any acids, with the exception of hydrofluoric, which seems to act on it very gradually.

Many experiments have been tried on siloxicon as a refractory material for lining furnaces, crucible manufacture, etc., and so far as these experiments have gone the substance promises to be a valuable addition to the industrial arts.

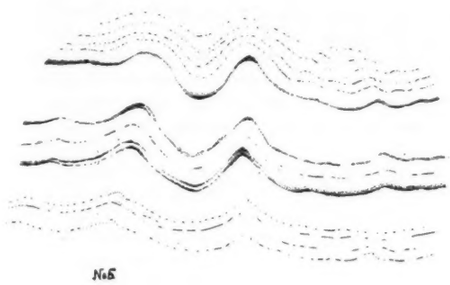



FIG. 5.

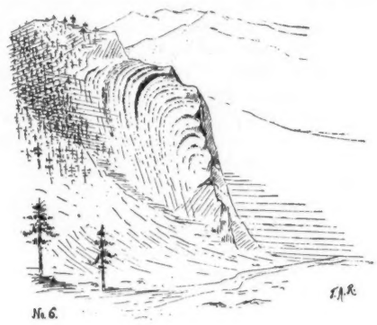



FIG. 6.

FOLDS IN THE LIAS, BOURG D'OISANS, FRANCE.

## ARCHEOLOGY AND MINERALOGY.*

By Paul Haupt.

In seven passages of the Old Testament we find reference to a precious stone of Tarshish, that is, southern Spain (Exodus xxviii 20, xxxix 13; Ezekiel I 16, x 9, xxviii 13; Song of Solomon, v 14; Daniel, x 6). As a rule, it is stated that the Greek Bible translates "chrysolite," and that the chrysolite of the ancients was our topaz; but the passage of Pliny quoted in support of this view clearly points, not to topaz, but to crystals of cinnabar. Anthrax also, which the Greek Bible has for *tarshish* in Ezekiel x 9, means cinnabar. Pliny calls cinnabar *minium*, while we apply this term to the yellowish-red oxide of lead which is called by Pliny *usta cerussa*. Pliny says the best chrysolites are those which, when brought in contact with gold, make the gold look like silver; this is, of course, due to the 86 per cent of mercury in the crystals of cinnabar (Pliny, xxxvii 126; *optimae sunt quae in conlatione aurum albicare quadam argenti facie cogunt*). Pliny states that the Romans received cinnabar almost exclusively from Spain, and the best cinnabar came from Sisapo, the present quicksilver mines of Almaden, north of Cordova in southern Spain.

Just as Pliny applies the name minium to cinnabar, so the ancients used the name "sapphire" for lapis lazuli. The ancients received lapis lazuli almost exclusively from the famous mines in Badakhshan, the mountainous region in northeastern Afghanistan, on the northeastern flank of the Hindukush, the Paropannisus of the ancients. The Assyrian king Esarhaddon (680-668 B. C.) calls this lapis lazuli mountain, *Bikn*, adding that it was situated in the remotest part of Media. Esarhaddon must have advanced to the Paropannisus, as far east as did, 300 years later, Alexander the Great, and the Macedonian conqueror would probably not have extended his victorious march so far east if he had not obtained in Babylonia some information regarding those eastern regions.

After we have established the fact that the sapphire of the ancients denotes lapis lazuli, while the stones of Tarshish represent crystals of cinnabar, we can explain the stanza in the Biblical love-ditties (Song of Solomon, v 14) where the maiden describing the beauty of her lover says:

"His arms are poles that are golden, bedecked with
rubies of Tarshish;
His body is one piece of ivory adorned with azure
blue sapphires."

That is, his bronzed arms are covered with ornamental designs tattooed in vermilion (the brilliant red pigment formerly made by grinding select pieces of cinnabar), while his white body is tattooed in ultra-marine (the beautiful blue pigment formerly obtained from lapis lazuli). Tattooing has been common among the Semites from the earliest times. The mark which the Lord appointed to Cain was a tattooed tribal mark.

I maintain, therefore, the stones of Tarshish are ruby-like crystals of cinnabar from the quicksilver mines of Almaden, and Tarshish is a Phœnician word meaning "dressing of ores," especially "spalling." King Solomon's mines were located in southern Spain and in southeastern Africa; the silver came from Spain and the Ophir gold from the Eldorado north of the former South African Republic, opposite Madagascar.

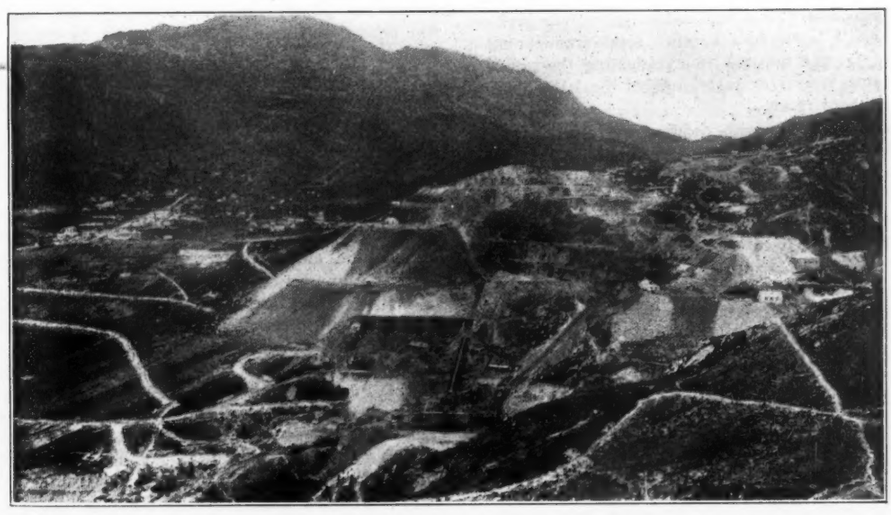
* Abstract of paper by Professor Paul Haupt, LL. D., John Hopkins University, read before the American Philosophical Society, April 3, 1903.

## MINING AT MT. LYELL, TASMANIA.*

The No. 4 level at Mt. Lyell was the original main working level for underground exploration purposes in the past, and is still regarded as the provisional adit for the open-cut. The horizontal section of the ore-body at No. 4 level being taken as a basis, the extent of overburden to be shifted in the course of time for the purpose of freeing the entire mass of ore above this level was marked off by prolonging proper batter-lines from the periphery of the body at that level to the surface of the ground, and it is towards this ultimate circumferential limit of the open-cast that the excavation of the overlying rocks is being systematically conducted. This programme involves very extensive works, not alone for the removal of ore, but still more for the removal of the overburden. The original mass of the former was estimated at 693,045 cub. yds., and of the latter at 1,500,000 cub. yds. The official estimate above referred to states that there were then left for removal above No. 4 level 1,626,665 tons of ore, and of this quantity 978,337 tons were available in the southeastern portions of the mine of an average assay of: Copper, 2.35 per cent; silver, 2 oz.; and gold, 0.0725 oz. No estimate made at any time for the purpose of guidance in open-cut operations has paid any attention to the extraction, by this means, of ore below No. 4 level, since it was considered that, for practical purposes, the latter was a sufficient limit *pro tem.* Since the payable ore, however, extends below No. 4 level, and in places has been found to reach as low as No. 5 level, 150 ft. lower down, the above programme of operations will have to be amplified by carrying open-cutting operations below No. 4 level until the apex formed by the junction of the batter lines is reached. It may be stated that the management already has the necessary provisions for this lower work in hand.

It is to be regretted that the continued low price of copper has a manifest influence on the payableness of the ore, and that, in consequence, certain grades are now being avoided and left standing which might with profit be included in the treatment in more prosperous times. However, as is apparent from the regularity of the assays published in the monthly returns, the management is endeavoring—and has met with exceptional success—to maintain the average copper assay of 2.35 per cent., which last year's estimate affirmed. For this purpose an elaborate system of sampling is in vogue, as a check on the values won and dispatched, and both the open-cut and underground surveys are kept strictly up to date.

Below No. 4 level the usual development work, by way of exploration drives and cross-cuts in advance of stoping, has been going on, hand-in-hand, during



MOUNT LYELL MINES, TASMANIA.

* Abstracted from the Report of the Secretary for Mines, Tasmania.

the year with the stoping operations themselves. The latter are carried out on local enrichments of more or less size, chiefly on the southeastern hanging wall end of the main mass, although the footwall is also in places characterized by occurrences of richer ore, and, in fact, the famous rich pocket which gave the impetus to developing the property on a large scale was so located. This bonanza returned $525,000 net, by sale in London, out of 850 tons of ore. These old workings were again entered this year, but examination revealed that in the first extraction, in 1894, the rich ore was very thoroughly removed.

Below the horizon of the above-mentioned workings, which are intermediate between Nos. 4 and 5 levels, the body has been contoured completely in No. 5 level, and proved to be somewhat smaller in extent than at No. 4 level. At No. 6 level, however, 100 ft. below No. 5 level, the body expereinces an increase in width, as has been established by the driving on footwall and hanging-wall. The latter work has recently rounded both the northeastern and northwestern corner of the ore-body, and will be brought to a closure in the course of a few months. Sixty feet below No. 6 level there is No. 7 level, in which the usual contour exploration work has also been started, but it was only carried for a short distance on each wall, it being preferable to contour at No. 8 level. This last level has been opened up from a vertical three-compartment shaft sunk in recent times from No. 5 level down through the hanging-wall schists, thus bringing its bottom close to the contact of conglomerate and schist, between which two rocks, it may be said, the ore-body as a whole is enclosed at its southern end. The shaft itself is so situated as to admit of raising to the surface at a point most suitably located for future hoisting and surface transportation. In No. 8 level, 100 ft. below No. 7 level, corresponding to 410 ft. below No. 4 level, or 730 ft. from the surface, cross-cut drives to the main ore-body have been driven, and the search for the pyritic main mass has recently been attended with success. Considerable driving has also been done on the contact of schist and conglomerate in Nos. 4, 5 and 8 levels, in a direction south from the main body, for the purpose of investigating the presence of continuations or repetitions of the latter, but so far without result.

Simultaneously with defining the contour of the main mass underground in the levels named, its assay value has also been determined at all points, and this has proved the bulk of the underground ore to be of a similar grade to that in the now untouched portions of the open-cut. Occasional richer patches have been met with, and the downward extent of the larger enrichments in the southeastern portion of the main mass has been traced as far as No. 8 level, thus showing them to characterize, in a more or less connected manner, the entire depth of the ore-body from the surface down. These richer shoots seem to be of a subsidiary nature, standing in some geological relation to the main mass, but not always by way of direct alteration of same. Especially in the greater depths of the mine, the character of the enrichments mineralogically, on the whole, may be said to be quite distinct from the main body, inasmuch as the ore is an occurrence of bornite, and occasionally chalcopyrite, or both together, in a quartz matrix, making the whole not very dissimilar from the ore occurring in the northern portion of the field, one mile and more away. The main mass, on the other hand, is emphatically only cupriferous iron pyrites, with rarely over 10 per cent of impurities, i. e., silica, heavy spar, alumina, etc. The enrichments referred to are undoubtedly off-shoots from the pyritic body, most likely of subsequent origin to same.

The following are data relating to the size, etc., of the ore-body:

At No. 4 Level—Total length, 660 ft.; greatest width, 270 ft.

At No. 5 Level—Total length, 510 ft.; greatest width, 210 ft.

At No. 6 Level—Total length, 510 ft.; greatest width, 270 ft.

Strike of major axis of deposit at No. 4 level—N.W. to S.E.

Strike of major axis of deposit at No. 5 and 6 Levels—N.N.W. to S.S.E., with a dip constantly to the southwest into the hill; on the whole, rather steeper nearer the surface than at a depth. The footwall extends very steeply from No. 3, past Nos. 4, 5 and 6 down to No. 7 level. The same is also true of the southeast corner of the ore-body, but at the northwest corner the underlie goes flatly to the southeast. The hanging-wall is very steep from Nos. 3 and 4 levels to No. 5, but flattens out between Nos. 5 and 6 levels in the middle of the body, there being a considerable bulge-out at No. 6 level.

The typical chemical composition of the pyritic ore may at present be taken as follows, the figures representing the last half-yearly average analysis: Iron, 40.30 per cent; silica, 4.42; barium sulphate, 2.50; copper, 2.35; alumina, 2.04; sulphur, 46.50 per cent.

The average composition of the underground ore for the same period was: Iron, 24.75 per cent; silica, 30.69; barium sulphate, 1.48; copper, 5.33; alumina, 6.30; sulphur, 30.00 per cent.

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## THE WHITING SYSTEM OF HOISTING.*

By H. H. WEBB.

In the course of the discussion Mr. Jennings said: "The late Major L. I. Seymour, before deciding on the advisability of adopting the Whiting hoist as the best type for hoisting on these fields, collected together statistics and sketches of the most typical deep-winding engines of the world, and discussed the matter of the best type with the leading engineers of these fields with all his data before them, and after this conference his preference was decidedly for the Whiting system."

If this refers to a meeting in the late Major Seymour's house, at which there were present, if the writer remembers rightly, Messrs. Seymour, Hammond, Catlin, Leggett, Yeatman, Wilson, Drake, Sederholm, Sidney Jennings, Pitchford, the writer and others, this meeting could hardly be called a conference or discussion. It was simply a social talk on winding engines, and the writer thinks the majority went away feeling that they had had a very pleasant social evening over blue prints and photographs of winding engines, and also with the feeling that they all had a lot to learn about winding plants for great depths.

The writer has referred to this because Mr. Hennen Jennings had taken up his residence in London at the time, and he thinks it would be a mistake to let the impression go out that at this meeting a discussion took place which resulted in what might be construed to mean a general approval of the Whiting hoist.

Of the men at that meeting, Messrs. Yeatman, Catlin, Pitchford, and the writer (and also Messrs. Behr, Gazzam and Norton, now here), visited the Lake districts and the Calumet & Hecla Mine later, and none came away with a favorable impression of the Whiting hoist.

Mr. Robeson practically affirms that the engineers and managers in that, one of the largest and most advanced mining districts in the world, are not quite capable of appreciating the Whiting hoist, because, though having had it in their midst at the Red Jacket Shaft for several years, they appear not to have discovered its possible virtues, but have preferred to equip their new shafts with a different type of winder, and it is to be supposed that they are as eager for the best type of hauling engine as we are. If the writer is rightly informed, the Whiting hoist does not exist to-day in the coal districts of Pennsylvania, where Mr. Robeson tells us it was first introduced. In fact, if the writer is not mistaken, there is only one Whiting hoist in America, that at the Red Jacket Shaft, which is admitted not to be a success; there is none in England and none on the Continent. The only one in the world that the writer knows of for which a really successful claim is made is the one at Kimberley, and yet at Kimberley, in equipping the new shaft of the Premier Mine for a depth of 3,000 ft., they are not installing a Whiting hoist. Surely one can hardly be blamed for being sceptical under these circumstances, especially as the Whiting hoist has long since passed the experimental stage.

Mr. Jennings' remark that "The method of construction of the ropes at Przibram is complicated and must be costly," and Mr. Robeson's assertion about the electric couple formed at each brazed joint by the acid water of the Witwatersrand mines lowering the factor of safety, call for some notice.

Mr. Catlin, who has recently visited Przibram and investigated the subject, assures the writer that the manufacture of these ropes is not complicated, and that as a matter of fact he did not know that it was so simple and easy.

Mr. Behr and the writer have also visited the works of Messrs. Roebling & Sons in America, and of Messrs. Felton & Guilleaume on the Continent, and have talked the matter over with these firms, and they do not consider the manufacture of taper ropes complicated. Further, Mr. Behr will be able to give some interesting information on this subject from a very recently published work by Obergrath, Prof. Hrabak, of the School of Mines at Przibram. The ores of Przibram contain in their composition a variety of metallic sulphides, and the waters of these mines should be more acid than the water encountered in the mines of the Rand. No mention, however, is made by Hrabak of any such action and effect as asserted by Mr. Robeson. On the Rand, there is probably not a rope of any considerable length used which is not brazed in several places, yet the argument raised by Mr. Robeson has never been brought forward here before. Certainly any one acquainted with mining on the Comstock in the seventies and eighties will remember the degree of acidity of the water in those mines, especially from the effect it had on pump valves.

From a mining point of view the conclusion of the writer is that a large area of ground can be attacked and successfully worked by means of stage winding through one shaft only, with the greatest safety, economy and least capital expenditure, enabling also the concentration of the entire surface plant at one point.

* Abstract from Discussion on Hoisting Plants, read before the Chemical and Metallurgical Society of South Africa.

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ELECTRIC POWER TRANSMISSION IN FRANCE.—The Gas Company, of Clermont-Ferrand, France, is now making an interesting hydro-electric installation, which is designed to reinforce its existing electrical plant. The new works are situated on either side of the River Sioule, below a large dam, which forms a lake about four miles long, having an average breadth of 130 meters and a surface of 250 acres. Independent pipe lines, fixed in masonry, will supply each of the six 1,000-h.p. turbines, which are of the horizontal-axle Francis type. Each turbine will be connected to a Westinghouse three-phase alternator of 800 kw. at 1,000 volts and 333 revolutions per minute. The two exciters, of 37.5 kw. each, are driven by small auxiliary turbines. The voltage will be stepped up to 20,000 by means of Westinghouse monophase transformers, grouped in threes. The overhead transmission line is to be double, and about 30 miles in length. Poles and cross-beams will be of wood, the latter being boiled in paraffin and then covered with a layer of tar. The setting up of the line, as well as the construction of the electrical and mechanical apparatus, has been undertaken by the Societe Anonyme Westinghouse, of Havre, France. The hydraulic part of the work has been hurried forward during the past year, and is now well advanced, while the mechanical and electrical equipment is just finished. Power will be sold at Clermont-Ferrand, which is a great center for the rubber trade, for both lighting and power, and considerable development of the existing works will be expected with cheap power.

## WIRE-ROD AND WIRE-NAIL PRODUCTION.

The American Iron and Steel Association reports that the production of iron and steel wire-rods in the United States in 1902 amounted to 1,574,393 gross tons, against 1,365,934 tons in 1901, 846,291 tons in 1900, 1,036,398 tons in 1899, and 1,071,683 tons in 1898, showing an increase of 208,459 tons, or over 15 per cent, in 1902, as compared with 1901. Of the total production in 1902, 1,574,187 tons were steel and 206 tons were iron rods. The following table gives the production by States in the last three years, in gross tons:

| States. | 1900. | 1901. | 1902. |
|---|---|---|---|
| Mass., Conn., R. I., N.Y., & N.J. | 134,502 | 176,101 | 201,653 |
| Pennsylvania | 240,533 | 386,037 | 509,802 |
| W. Va., Ky., Ala., & Ohio | 244,731 | 422,679 | 440,558 |
| Indiana and Illinois | 226,525 | 381,117 | 422,380 |
| Total | 846,291 | 1,365,934 | 1,574,393 |

Pennsylvania made the largest quantity of wire rods in 1902, with Illinois second, Ohio third, and Massachusetts fourth.

The following table gives the production of wire nails in 1901 and 1902, in kegs of 100 lb.:

| States—Kegs of 100 pounds. | 1901. | 1902. |
|---|---|---|
| N. H., Mass., R. I., and Conn. | 71,553 | 309,651 |
| New York | 136,118 | 132,854 |
| Pennsylvania | 3,118,508 | 4,219,604 |
| Md., W. Va., Ky., Ala., and Ohio | 3,633,894 | 3,251,918 |
| Indiana and Illinois | 2,716,748 | 2,902,006 |
| Mich., Wisconsin and California | 127,001 | 166,213 |
| Total | 9,803,822 | 10,982,246 |

The production of wire nails in the United States in 1902 amounted to 10,982,246 kegs of 100 lb., as compared with 9,803,822 kegs in 1901, an increase of 1,178,424 kegs, or over 12 per cent. In 1900 the production amounted to 7,233,979 kegs, in 1899, to 7,618,130 kegs, in 1898, to 7,418,475 kegs, in 1897, to 8,997,245 kegs, in 1896, to 4,719,860 kegs and in 1895 to 5,841,403 kegs. The wire nails produced in 1902 were made by 62 works, as compared with 61 in 1901. The production in 1902 was greatly in excess of that of any preceding year. Almost all the wire nails produced in 1902 were made of steel.

## CARRYING THE SURFACE MERIDIAN DOWN A VERTICAL SHAFT.

By George C. McFarlan.

Two methods are in general use for carrying a meridian underground, where there is only one vertical shaft available. The most common method is to suspend either two of four plumb-lines from top to bottom. This method possesses several obvious disadvantages. In many shafts it is impossible to suspend plumb-lines in the clearance space between the buntons and cages and have the lines clear of the timbers all the way down. In a case of this kind a template would have to be set in one of the cageways, the lines hung from the template, and after making the surface observations the surveyor would have to carry his transit down the pump compartment to line up underground. Again it is almost impossible to line a transit up with two plumb-lines if there is much dripping water or much air current in the shaft, as either tends to deflect the lines irregularly from the vertical. In the other method, timbers are placed across one of the hoisting compartments, the transit is set up over the shaft and leveled up, two stations lined up on the surface, and then two points lined in on the shaft set near the bottom, using either a top or a side telescope. The only objection to this method is that the transit must be provided with an auxiliary telescope, which has no use, except for this particular purpose. The Saegmuller solar attachment may be used for vertical sighting, but the objective is too small for long sights.

Sometime ago the writer had occasion to locate the air-shaft at a coal mine where it was desired to sink and raise at the same time. The main shaft, which was rather wet, was down 190 ft. I first established the underground meridian, using two fine steel wires and heavy plumb-bobs, afterward, by direct sighting, using the solar attachment as a top telescope. I found that the meridian established by direct sighting varied 3′ from the meridian as established by the plumb lines.

As the solar telescope did not possess sufficient defining power to locate fine points at that distance, I resolved to use the main telescope for vertical sighting. This I accomplished, as shown in Fig. 1. I procured two oblong cast-iron blocks, weighing about 150 lb. apiece, with three bolt-holes bored through each of them.

Two of the tripod legs were shortened and set on the shaft sill 4 ins. from the edge; the third leg was tightly clamped between the two cast iron blocks,

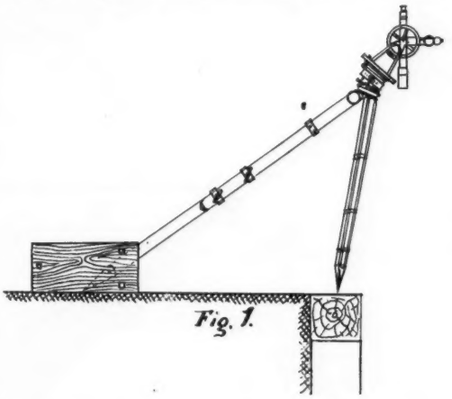

Fig. 1.

the leg being extended, so that the tripod head leaned over the edge of the shaft several inches. The plate was then tilted with the leveling screws until the main telescope could be swung 2° each side of the vertical. Using the solar attachment level as a transverse level, and keeping the telescope level with the long bubble, the limb was rotated until the horizontal axis of the telescope was exactly level. I then located two points on the shaft bottom, revolved the telescope and lined in two stations on the ground, also two points 20 ft. apart vertically on the wall of

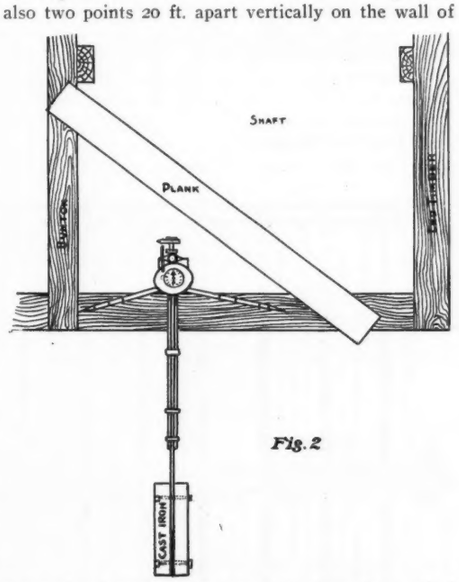


Fig. 2.

the engine house; this last as a check on the vertical path of the line of sight. I found this set-up to be very rigid, and the higher power of the large telescope to be of great advantage in accurately defining the underground points. The points thus established checked to the minute with the points located by the top telescope. I used No. 10 horseshoe nails with diamond-shaped holes punched in the flattened heads. For illumination the light of a powerful acetelyne lamp was reflected by a 45° mirror upon a horizontal plate of ground glass held under the nail-head.

By using a telescope of large aperture and a good striding level and setting the transit over a shaft in this manner, points can be accurately located in a shaft several hundred feet deep. In case the surveyor has neither a striding level nor a solar level to his transit, the horizontal axis can be leveled as follows: Locate two points, one vertically over the other, on the engine house wall in front of the shaft, and draw two horizontal lines through each point. After the transit is set up over the shaft, revolve limb until axis appears about level, clamp, and line in two points on these horizontal lines. Measure to the points previously located. Repeat until measurements are the same; then the telescope will revolve in a vertical plane and the stations can be located on the shaft bottom.

## USING POWDER IN ILLINOIS COAL MINES.

By Our Special Correspondent.

The large number of fatal explosions in the coal mines of Illinois in the past two years has set both operators and miners to work to try to ascertain and overcome the cause. Some of these are called gas explosions, and some dust explosions; while, in fact, many of them are powder-smoke explosions aggravated by fine dust in the air, from blasts or from the roads. They are largely due to the reckless and extravagant use of blasting powder, and with a view to lessening this, the legislative committee of the Illinois Coal Operators' Association and the United Mine Workers' State officers recently met and drafted a bill, which is now before the State Legislature. This bill limits the quantity of powder with which any hole may be charged to 60 lineal ins. 1½ ins. in diameter, specifying how the holes shall be drilled, and fixing the penalty for violation at $300 fine, or three months' imprisonment, or both.

If this bill becomes a law, as it is no doubt will, it will reduce, but will not cure the evil. The most effective plan to prevent the use of powder in such large quantities, would be to make it an object to the miners not to blow their coal into slack as they do now, and the only way to do this is to pay the miners for screened coal instead of mine-run. The result of the mine-run system in Illinois is that mining or cutting, except by machine, is a thing of the past, and, except in machine mines, the coal is shot off the solid, and the amount of powder used and the percentage of slack produced are steadily increasing. The difference between machine mining and hand mining (or more properly, powder mining) is so small as to make it no object, from a financial standpoint, for the operators to put in machines. In the past month the miners have decided that shot-firers, while they may not lessen the danger of damage to property, will lessen the number of lives in danger, in case of an explosion, and along this line they have decided, at certain mines, that they are afraid to work without shot-firers.

Some months ago the Chicago-Virden Coal Company put on shot-firers at its mines, at Virden, Auburn and Chatham, thinking to produce more coal thereby, but the result was not what was expected. Following the explosion at the Athens Mining Company's mine, at Athens, about six weeks ago, the miners there demanded shot-firers, were refused, but continued at work without them, as did the miners at several other mines in the vicinity. However, a few days later, the miners employed by the Cantrall Co-Operative Coal Company, at Cantrall, demanded shot-firers, and on being refused struck for a month, till the company agreed to let them have shot-firers at their own expense. This resulted in strikes at two mines at Farmington and Edwards in the Peoria District.

On April 27 and 28, the operators' and miners' State executive boards held a joint meeting in Chicago to consider the shot-firer question, and they agreed that the miners at these two places should return to work at once with temporary shot-firers, at their own expense, to be selected from among the miners at each mine. The shot-firing should be done in such a way as not to interfere with the night shift for entry driving or miscellaneous work. It was also agreed that miners' State officers should proceed at once to these mines and see that all the provisions of this agreement are carried out. As soon as possible, a committee of two operators and two miners is to be appointed by the two executive boards, to make a careful examination and investigation of the mines and conditions, and try to devise some means to lessen the liability of explosions and to decide whether shot-firers are necessary. The committee has not yet been named.

## ELECTROLYTIC ZINC EXTRACTION BY THE HOEPFNER PROCESS.

By E. Guenther.

(The Hoepfner process for the lixiviation of zinc from ores and electrolytic deposition of the metal from the solution is one of the few of the many inventions of this type which has received a practical trial, and is the only one which has continued in use at any works where introduced. Although the plant at Fuhrfort am Lahn, in Germany, is no longer in operation, the process has continued in use at the works of Brunner, Mond & Co. at Winnington, near Chester, England. For this reason a technical account of the process is of considerable interest. As to its general features there is already an extensive literature, the late Dr. Hoepfner having been a free writer, but the most convenient references are the various volumes of *The Mineral Industry*, especially VI, 668 and 675, VII, 743, and IX, 688. It is generally recognized by electrometallurgists that the large amount of power required for the decomposition of zinc solutions precludes an economically successful process unless the anode reaction be utilized in the winning of a valuable by-product. The latter is done in the Hoepfner process, and Mr. Guenther's estimates are interesting as showing what might be expected under certain conditions in Germany, which it will be perceived are widely different from what would obtain in America.—Editor.).

The Hoepfner process was in use at Fuhrfort am Lahn during 1895, 1896 and 1897. Its discontinuance in 1898 was due not to technical failure, but to unfavorable conditions of another character, especially personal differences. The raw material was cinder from the zinciferous pyrite mined from the large deposits at Meggen, on the Lenne, in Westphalia, which is used extensively for sulphuric acid manufacture. The zinc tenor of this cinder varies from 10 to 16 per cent. Early attempts to extract the zinc by chloridizing roasting and lixiviation (vide *Berg- u. Huttenmannische Zeitung*, 1884, p. 475, and ibid. 1894, p. 1) were failures, the residues still containing up to 4 per cent Zn, as sulphide, which, aside from the loss of zinc, rendered the material unfit as an iron ore, while a second roasting was too expensive. Better results in this respect were obtained at Fuhrfort.

*Roasting and Leaching.*—The practice at Fuhrfort consisted in grinding the cinder to 1.5 mm. size, mixing with 18 to 20 per cent of common salt, and roasting in a muffle furnace for 20 to 22 hours at a temperature of not to exceed 650° C. The charge of cinder per furnace was 4,500 kg., and the coal consumption 900 kg. per charge. The charge drawn from the furnace was leached, still hot, in iron vats with water or dilute liquor from a subsequent stage, affording a solution containing about 10 per cent Zn, besides sodium chloride, sodium sulphate, and small quantities of lead, copper, cadmium, arsenic, manganese and thallium. The sodium sulphate was deposited as $Na_2SO_4 + 10H_2O$ by cooling the solution to —5° C., after which iron and manganese were precipitated by addition of bleaching powder and marble dust, and finally the electro-negative metals by means of zinc dust. A clear solution of the chlorides of zinc and sodium was thus obtained, which on the average assayed 20 per cent $ZnCl_2$, 22 per cent Na Cl, 0.05 to 0.06 per cent $H_2SO_4$, and traces of lead, iron and thallium, and after acidification with a little muriatic acid, free from arsenic, was ready for the electrolysis.

*The electrolytic vats* were V shaped tubs, in which the anode cells and cathodes were inserted. The anode cells were separated from the cathode compartments by means of diaphragms of nitrated cloth, and were closed in on top, where they were made tight by means of melted pitch. The arrangement of the vats is shown in Figs. 1 and 2, wherein *a* represents the cathode, *b* an iron sleeve to secure it to the shaft *c*, *d* the anode, and *e f g h* the mechanism for revolving the cathodes, while *i* and *k* are conductors for the current. Artificial carbons, hard as glass, were used as anodes; the cathodes consisted of discs of zinc or iron, arranged vertically on the horizontal shaft, as shown, so as to revolve between a pair of adjacent anode cells. Each vat had eight anode cells and seven cathode compartments. The vats and the anode cells were made of pitch pine wood, which is not desirable, since any resinous wood forms soaps with the zinc chloride solution, against which white beech has been found to have the greatest resistance.

The vats were arranged in series on several ter-

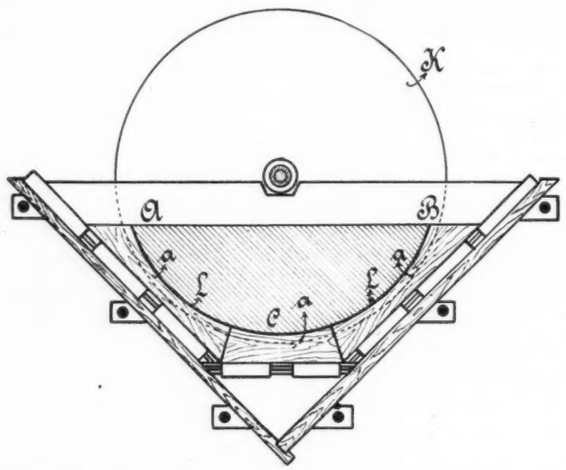


FIG. 1.—TRANSVERSE SECTION OF ELECTROLYTIC VAT THROUGH CATHODE CELL.

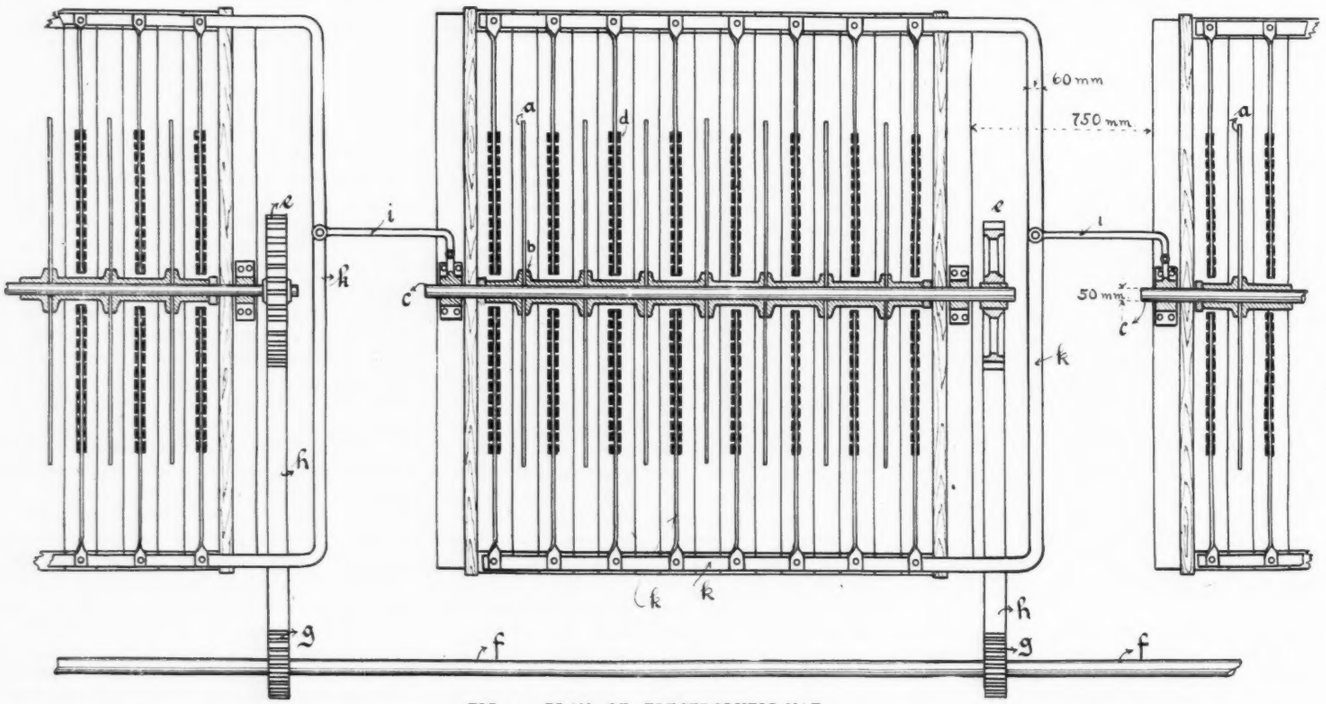


FIG. 2.—PLAN OF ELECTROLYTIC VAT.

races, so that the solution would flow from the first to the second, and so on; or each vat could obtain an independent supply. The latter method, although the more complicated, is preferable. In either case, however, the electrolyte enters each vat

on one of the longitudinal sides, and comes out at the top of the opposite side, so there is only a circulation past the cathodes, but the solution can pass beneath the anode cells; the diaphragms prevent a lively motion in the anode cells. The solution entering the vats had a tenor of 9.5 to 10 per cent Zn, and the tenor of zinc in the bath should not be less than 2 per cent; at 1.5 per cent Zn the cathodes become gray. The acidity had to be maintained at 0.08 to 0.12 per cent HCl, and during the electrolysis acid was added to the extent of 0.03 to 0.05 gram HCl per ampere-hour. A good deposit of zinc could not be obtained from neutral or alkaline solutions.

*Deposition.*—The vats were connected up in series. A current of 1,000 amperes was used, corresponding to a density of 100 amperes per square meter, which in my opinion was less than is desirable. The terminal voltage of the bath at 100 amperes per square meter was 3.3 to 3.6. In regular operation zinc would deposit on the cathodes in dense form, silver-white in color, and the current efficiency was 97 per cent, or more, of the theoretical. There appeared to be a tendency toward irregular deposition at the circumference of the discs, as the result of the locally higher current density, which could, of course, be obviated by a suitable arrangement of the cathodes.

After 30 to 35 days from 800 to 1,000 kg. of zinc would be deposited per bath, when the cathodes were lifted out and replaced by a new set. The zinc then had to be remelted in a reverberatory furnace, losing 1.5 to 2 per cent in weight, wherein the consumption of coal was 7 to 8 per cent. The final product assayed 99.97 to 99.98 per cent Zn, 0.01 to 0.02 per cent Pb, and traces of iron and thallium.

*Chlorine Recovery.*—The anode cells had an outlet pipe of glass or hard rubber, which was connected by means of rubber tubing with lead pipes leading into the main pipe of the vat. The chlorine gas liberated by the electrolysis was used for making bleaching powder. In the anode cells it had a concentration of 25 to 50 per cent Cl. Aside from some steam which was soon condensed in the pipes, whence it was drained off, the gas was free from injurious impurities providing the electrolyte had been properly refined, but if the latter contained much sulphates the gas would not be free from carbon dioxide. The gas was conveyed from the vats to the bleaching powder chambers, of which there were four arranged in series in such a way that any one could be used as the first. Practically only two chambers were always in use. The gas escaping from the fourth chamber was free from chlorine.

The general arrangement of the electro-deposition house is shown in Figs. 3 and 4.

COST OF PLANT AND OPERATION.

I have prepared the following estimate of the cost of a plant for the Hoepfner system and its operation, basing the figures for the most part on the results of practical experience and stating them generally too high rather than too low. The plant is to have capacity for producing 650 metric tons of spelter per annum and the corresponding quantity of bleaching powder.

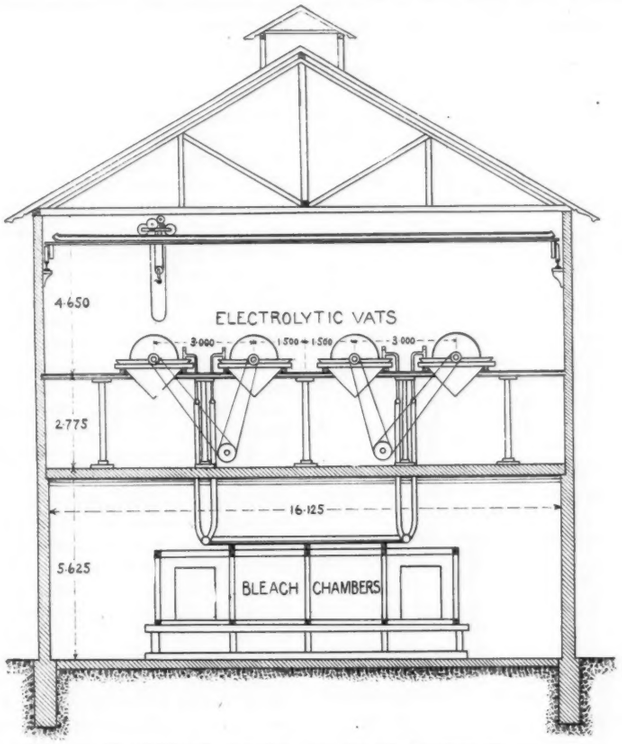


FIG. 3.—TRANSVERSE SECTION OF ELECTRO-DEPOSITION HOUSE.

for solutions, $2,500; solution tanks and reservoirs, $6,250; pumps and stirring mechanism, $1,500; crushing mill, $1,250; miscellaneous items, $3,250; total, $45,000.

*Cost of Operation.*—Raw material (pyrites cinder), 18,000 kg. (4,500 kg. per furnace) at $1.25 per 1,000 kg., $19.15; 3,240 kg. salt (18 per cent) at $2.50 per 1,000 kg., $8.10; 3,600 kg. coal (20 per cent) at $5 per 1,000 kg., $18; total, $45.25 per 22 hours, equals $17,770 per annum of 360 days. The cost of labor per day will be as follows: 16 roasters (two per furnace per shift) at 75 cents, $12; 2 foremen at 85 cents, $1.70; 4 men in the leaching department at 70 cents, $2.80; 4 men in the mill at 70 cents, $2.80; total, $19.30, equals $6,948 per 360 days. In purifying the solution there will be required 30 by 3 by 24 equals 2,160 kg. of coal to generate 30 horse-power, and 240 kg. to produce steam for heating, a total of 2,400 kg. at $5 per

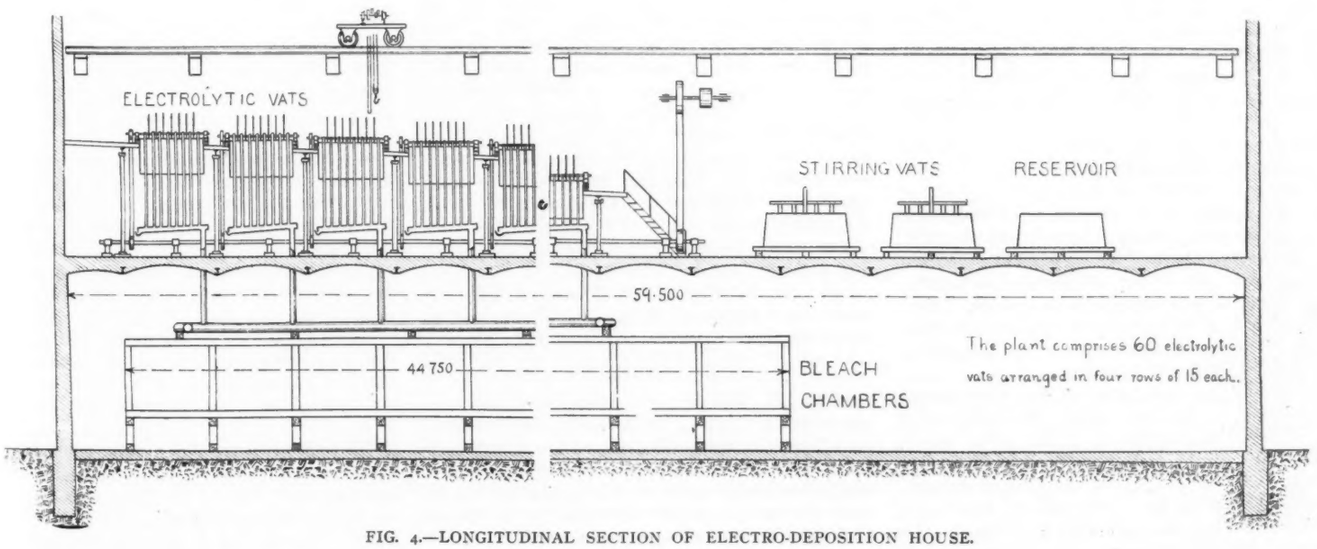


FIG. 4.—LONGITUDINAL SECTION OF ELECTRO-DEPOSITION HOUSE.

*Roasting and Leaching Plant.*—Roasting and leaching houses, and chimney, $7,500; boiler and engine house and house for purifying solution, $7,500; four roasting furnaces, $7,500; single cylinder condensing steam engine of 30 horse-power, and boiler plant, $2,750; refrigerating machine, with necessary pumps, cooling apparatus, pipes, etc., $5,000; pipes

1,000 kg., $12; 120 kg. of bleaching powder, at $30 per 1,000 kg., $3.60; 30 kg. of zinc dust, at $62.50 per 1,000 kg., $1.90; filter cloth, $1; oil, waste, packing, ammonia, etc., $1; and repairs, $1; total, $20.50, equals $7,380 per 360 days. The labor in the purification department will be 4 men at 75 cents, $3; 4 boys at 44 cents, $1.75; 2 machinists at 88 cents, $1.75; total, $6.50 per day, equals $2,340 per 360 days. Amortization may be reckoned at $3,450 per annum, estimating it at 3 per cent on the cost of the buildings ($15,000) and 10 per cent on the equipment ($30,000). The total cost of obtaining the purified solution, ready for electrolysis, will be therefore $37,888 per annum.

*Yield of Products.*—The furnace charge of 4,500 kg. of cinder, plus 810 kg. of salt, yields a product of 5,810 kg., and the average time of working a charge being 22 hours, the chloridized material drawn from four furnaces in 360 days is $5.810 \times 4 \times 360 \times (24 \div 22) = 9{,}127$ tons. Estimating an extraction from this of 7.5 units of zinc (at Fuhrfort it was 8.5 units) and a loss of 5 per cent in purifying, the zinc content of the pure solution will be $9{,}127 \times 0.075 \times 0.95 = 650$ tons approximately. As by-products there will be obtained 45 to 50 per cent of the weight of the cinder in Glauber's salt, and 80 per cent in iron ore, wherefore the quantity of the former will be $4{,}500 \times 4 \times 360 \times 0.45 \times (24 \div 22) = 3{,}181$ tons, and of the latter, by the same kind of reckoning, 5,655 tons.

Reckoning the value of 3,181 tons of Glauber's salt at $2.50 per ton and 5,655 tons of iron ore at $22.50, the value of these by-products will be $20,676.25, deducting which from the operating expense of $37,888 will make the cost of 650 kg. of zinc in solution, $17,211.75.

In re-melting 650 kg. of electro-deposited zinc there will be obtained 637 tons of refined metal and 13 tons of dross. There will be obtained as a by-product from the electrolysis 1,775 tons of bleaching powder. Reckoning the value of the zinc at $87.50 per ton, of the dross at $50 per ton and of the bleach at $30 per ton, the gross value of the products will be $109,637.50.

*Electrolysis and Manufacture of Bleaching Powder.*—The production of 650,000 kg. of zinc, estimating a current efficiency of 95 per cent (at Fuhrfort it was generally upward of 97 per cent), requires $(650{,}000 \times 1{,}000) \div (1.21 \times 0.95) = 565{,}500{,}000$ ampere-hours, or 65,450 amperes per hour. Assuming the effective current density to be 120 to 125 amperes per square meter, there will be 55 baths in steady operation, and five baths in reserve will make a total of 60. Assuming the pressure at 125 amperes per square meter to be 4 volts (in fact, it is somewhat less) the work to be done will be $(565{,}500{,}000 \times 4) \div (736 \times 0.90) = 3{,}414{,}856$ h.p.-hours, the dynamo being computed as having an efficiency of 90 per cent. In addition, there is required about 60 horse-power for light and operation of motors, or 518,400 h.p.-hours per annum, making a grand total of 3,933,256 h.p.-hours required. The cost at 0.75 cent per h.p.-hour ($64.80 per 360 days of 24 hours), which ought to be attainable with a proper steam plant, even at a high price for coal, will be $29,499.40. The steam plant must be of $3{,}933{,}256 \div (360 \times 24) = 456$ horse-power.

The production of 650 tons of zinc corresponds to 710 tons of chlorine, which will make 1,775 tons of bleaching powder, requiring 1,065 tons of lime. The cost of 1,065 tons of lime at $5 per 1,000 kg. will be $5,325, and the cost of barrels, paper and packing for 1,775 tons of bleach, at 37.5 cents per 100 kg., will come to $6,654.25. In remelting 650 tons of zinc there will be required 52 tons (8 per cent) of coal, which at $5 will cost $260. In the electrolysis there will be required 28.275 tons of HCl = 90 tons of muriatic acid of 20° B., which at $25 per ton will cost $2,250.

*Cost of Electrolytic Plant.*—Buildings for electrolysis, manufacture of bleaching powder, boiler and engine house, storehouses and chimney, $22,500; 5 tubular boilers, erected, $8,125; triple-expansion engine of 475 effective horse-power, $20,000; transmissions, $3,000; 2 dynamos of 1,250 a. × 150 v. for electrolysis, $9,000; one dynamo for light and power, $1,500; conductors, switchboard, measuring instruments, etc., $2,000; lime mill, $250; equipment for smithy and carpenter shop, $1,000; 4 bleaching powder chambers, $12,500; 60 electrolytic baths, with extra anodes and cathodes, at $212.50, $12,750; traveling craine, $500; re-melting furnace, $1,000; pumps, reservoirs, etc., $2,500; laboratory outfit, $1,000; railway connection, $3,000; miscellaneous items, $6,875; total, $107,500.

Inasmuch as the roasting and leaching plant will cost $45,000, the total investment required, allowing $10,000 for a site of 20 acres of land, will be $162,500.

*Cost of Electrolysis.*—The expense for materials will be as follows: Coal for power, $29,500; coal for re-melting zinc, $260; 1,065 tons caustic lime, $5,325; barrels, etc., $6,655; muriatic acid, $2,250; oil, waste and miscellaneous supplies, $900; repairs, at 2 per cent, $1,700; 650 tons of zinc from the extraction department, $17,212; total, $64,192. The labor account per day will be as follows: 3 foremen at 88 cents, $2.65; 2 machinists at 88 cents, $1.75; 2 firemen at 75 cents, $1.50; 1 plumber, $1.50; 10 men in the vat-room at 75 cents, $7.50; 2 laborers, at 67½ cents, $1.35; 3 carpenters and 3 smiths at 88 cents, $5.25; 2 laboratory assistants at 50 cents, $1; 3 men for lime mill and chambers, at 75 cents, $2.25; 5 laborers for handling material at 67½ cents, $3.40; total, $28.15, equals $10,134 per 360 days. Amortization of plant is reckoned at $14,787.50, allowing 3 per cent on cost of buildings ($22,500), 12.5 per cent on the bleaching powder chambers ($12,500), 50 per cent on the electrolytic baths ($12,750), 30 per cent on the laboratory ($1,000), and 10 per cent on the remainder of the plant ($58,750). The total cost per annum will be therefore $64,192 + $9,864 + $14,787.50 = $88,853.50. Allowing $7,250 for salaries and general expense, not, however, including taxes or royalties, the total annual expense of operation will be $96,103.50.

*Estimated Profit.*—The value of the Glauber's salt and iron ore having been deducted from the cost of roasting and leaching and the remainder having been debited to the electrolytic department, the profit in the whole process will be $109,637.50 — $96,103.50 = $13,534, which would be the return on an investment of $162,500 in plant. This return would be increased by the use of an ore richer in zinc, or by the utilization of a water power, or by the operation of a larger plant. The capacity of the plant upon which these estimates are based corresponds with what was planned at Fuhrfort, which was designed largely for experimental purposes. The cost of the same plant as estimated above, but for a yield of 8.5 units of zinc instead of 7.5 would be $167,500, and the annual profit $19,140.50. The net return for other grades of material and different costs for power, material and labor can be estimated from the data that have been given.

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COAL IN INDIA.—According to *Indian Engineering*, the Kashmir State has decided to build some thirty-six miles of railway to the Ladda coalfield, and the route is now under investigation. Ladda coal is doubtful as to quality, but the Durbar has secured the services of Mr. Simpson, of the Indian Geological Survey, to prospect for better.

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A NEW EXPLOSIVE.—The London *Colliery Guardian* says that a new high explosive for blasting purposes is "Cheddite," which is claimed to be equal in blasting effect to gelignite, but unlike explosives of the nitro-glycerine class, it is unaffected by extreme heat and cold. Curtis & Harvey, Limited, are the manufacturers of the new explosive.

ONE WAY OF TREATING THE LABOR QUESTION.—A correspondent sends us the following extract from a letter written by a gentleman who is in charge of a smelter in Mexico. This shows one way of treating the labor question from a practical point of view. The extract reads as follows: "They have had a great time for the last four days to get men on the furnaces. The wind has been from the north, and made the gases very bad on the feed-floor so that the men would not come to work. To-day the police brought up a squad of about 15 that they had in jail—petty offenders, vagrants and the like—and pressed them into the service of the smelter. Some of them did not stay long, but if they are caught, they will have to join the army and fight the Yaquis. That is the way they recruit the regiments here. Colonel ——— comes in here occasionally, takes the men they have gathered in jail, and marches them off towards the Yaqui country. That is the way they have here of getting rid of the surplus population."

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## ABSTRACTS OF OFFICIAL REPORTS.

### *Alaska United Gold Mining Company.*

This company has operated two mines on Douglas Island, Alaska, adjoining the properties of the Alaska Treadwell and the Alaska Mexican Company. The two mines are known as the Ready Bullion and the 700-Foot Claim. The total returns from bullion obtained during the year 1902, which is covered by the report, amounted to $491,920. Operating expenses were $477,943, and interest paid $4,063, making a total of $482,006, and leaving a balance of $9,914 as profit for the year. The company's capital stock is $1,000,000 in shares of $5 each; of which 19,800 shares are still in the hands of the company. The earnings and expenses of the two claims, as given separately, are shown in the table below:

| | —Ready bullion.— | | ——700 ft.—— | |
|---|---|---|---|---|
| | Amt. | Per ton. | Amt. | Per ton. |
| Free gold from mill .. | $194,558 | $0.8589 | $96,171 | $0.8113 |
| Base bars ..... | 2,548 | 0.0113 | ..... | ..... |
| Sulphurets treated ... | 137,032 | 0.6049 | 61,612 | 0.5197 |
| Total receipts ..... | $334,138 | $1.4751 | $157,783 | $1.3310 |
| Mining ..... | $225,480 | $0.9954 | $90,189 | $0.7608 |
| Milling ..... | 71,943 | 0.3176 | 22,666 | 0.1912 |
| Sulphuret exps. ..... | 29,958 | 0.1323 | 9,525 | 0.0804 |
| General expenses ..... | 3,115 | 0.0138 | 2,596 | 0.0219 |
| San Fran. office ..... | 1,364 | 0.0060 | 1,137 | 0.0096 |
| London office ..... | 270 | 0.0012 | 225 | 0.0019 |
| Consulting engineer .. | 559 | 0.0024 | 466 | 0.0039 |
| Bullion charges ..... | 1,843 | 0.0081 | 887 | 0.0075 |
| Damage suits ..... | ..... | ..... | 9,958 | 0.0840 |
| Total expenses ..... | $334,532 | $1.4768 | $137,649 | $1.1612 |
| Construction ..... | 4,992 | 0.0220 | 771 | 0.0065 |
| Total ..... | $339,524 | $1.4988 | $138,420 | $1.1677 |
| Deficit or net ..... | D.$5,386 | D.$0.0237 | N.$19,363 | N.$0.1633 |

In addition to the deficit on the Ready Bullion, there was a charge of $4,063 for interest, making a total of $9,449. Deducting this from the profit on the 700-Ft. Mine, leaves a net balance of $9,914 for the year.

*Ready Bullion.*—At the Ready Bullion, exploration and development work included 2,845 ft. in all, of which 58 ft. was shaft sinking. The main shaft is now down 58 ft. below the 900-ft. station. The ore reserves already open and proved, including 75,000 tons left as support around the shaft, amounted at the close of the year to 327,160 tons. The output of ore for the year was 226,522 tons, nearly all of which came from the 600-ft. level and below. The average assay value of 1,350 samples taken was $1.82 per ton. The mill of 120 stamps crushed during the year 226,522 tons of ore, with the yield shown above. The mill was in operation 357 days 4 hours, and the average duty was 5.29 tons per stamp per day.

The table shows a deficit for the year, but at the close of the year there were 611 tons of sulphurets on hand, which should yield about $15,700 after deducting cost of treatment. The quantity of sulphurets saved by concentration was 4,640 tons.

*700-Foot Claim.*—On this mine only 382 ft. of development work were done during the year, the re-

sults being so discouraging that further work was discontinued. The ore reserves are now practically exhausted. The output for the year was 118,541 tons. The average assay of 592 samples shows a value of $1.60 per ton. The 120-stamp mill crushed during the year 118,541 tons of ore, and 2,188 tons of sulphurets were saved by concentration. The mill was run only 198 days 6 hours during the year, a good deal of time being lost by short supply of ore. The report says:

"As the reserves of pay ore in the 700-Foot Claim are exhausted the directors, on recommendation of Consulting Engineer Bradley, have accepted an offer from the Alaska Treadwell Gold Mining Company, to lease the mine, together with the water power and steam power plants connected with the 100-stamp mill, at a monthly rental of $300 and 50 per cent of the net profits of all ore which may be taken from said mine. The lease runs for a term of five years from November 30, 1902, the date the mill closed down. Either company may terminate said lease, by giving the other company 60 days' notice in writing. The Treadwell Company must drive all its levels to the 700-Foot Claim line, and as that company has an advantage in operating costs of about 35c. per ton, because of larger ore-bodies, large water power, and mill capacity, it may be able to operate the claim at a small profit. It is the intention to dismantle the 700-Foot Claim mill gradually, melting the plates for their gold and copper value, and selling the duplicate parts to the Ready Bullion and Treadwell stamp mills, or to any other parties who may desire to purchase at a fair price the whole or any part of the mill. The mining equipment and tools will also be sold gradually to the adjoining properties."

*General.*—Three accidents occurred in the 700-Foot Claim during the year, one being fatal and the other two slight. The man killed fell from a skip. No accidents occurred in the Ready Bullion Mine, but in the mill one man had his hand crushed. The ore-bodies in the 700-Foot Claim have been exhausted, as stated above, and all work stopped. The Alaska Treadwell Company has connected its 600-ft. level with the 550-ft. level of the 700-Foot Mine. The shaft has been fitted with light cages, and will be used for handling powder by the Treadwell Company. Labor of all kinds was plentiful during the year.

### *Le Roi No. 2, Limited.*

The report of this company, whose property adjoins the well-known Le Roi Mine, in the Rossland District of British Columbia, covers the year ending September 30, 1902. The accounts, as stated in sterling from the London office, show receipts from ore, £117,188; interest, etc., £706; total, £117,894. Expenses at the mine were £64,347; London office, £3,086; miscellaneous, £5,434; total, £72,907, leaving a net balance of £44,987.

Exploration work included 2,904 ft., of which 180 ft. were shaft sinking. The total cost of this work was $80,878. The ore taken out was 63,262 dry tons, the metal contents being as follows:

| | Quantity. | Value. | Per ton. |
|---|---|---|---|
| Gold, oz. | 32,435 | $648,698 | $10.25 |
| Silver, oz. | 82,548 | 44,563 | 0.70 |
| Copper, lb. | 3,001,027 | 375,655 | 5.94 |
| Total value | | $1,068,916 | $16.89 |

The average costs per ton of mining and working are given as follows:

| | |
|---|---|
| Mining labor | $2.020 |
| Supplies, power, tramming, etc. | 1.195 |
| Depreciation of buildings and equipment | 0.956 |
| Reserve, accidents, etc. | 0.363 |
| General expenses | 0.487 |
| Total cost of mining | $5.021 |
| Direct smelting charge | $6.000 |
| Indirect charges | 1.870 |
| Total cost of smelting | $7.870 |
| Total cost per ton of realization | $12.891 |

The directors' report says: "The heavy fall in the price of copper and silver during the last nine months of the financial year decreased by $121,182, what would otherwise have been the net earnings of the company had the price of the previous year been maintained.

"The smelting charges to which the company was bound for two years by an agreement made by Mr. MacDonald with the Northport Smelter, on August 16, 1901, amounted approximately to $8 per ton. The directors took counsel's opinion as to the possibility of nullifying this agreement on the ground that it was signed by Mr. MacDonald for both sides, under a very limited power of attorney, but were advised that there were small chances of success.

"The largest profit was shown in the month of April, after which there was a steady decrease in the value of output and a corresponding decrease in profit. On September 21 the manager cabled recommending the reduction of the output to 3,500 tons per month, which, in view of the smelting position, the board thoroughly approved of, expressing at the same time a hope that the grade of ore would be correspondingly increased. During the months of September and October it would appear that the mine was actually being worked at a loss. As soon as the board ascertained this, they prohibited the output of any ore under $17, as it was evident that the mine was simply being denuded of ore which, it is believed, under improved methods of treatment, can be made to yield a material profit. According to Mr. Macdonald's statement of high-grade ore in sight, dated June 21, and circulated among the shareholders, there should have been no difficulty in continuing the output of $17 ore. On October 28 the manager recommended the cessation of shipments till better rates for treatment could be secured to which the directors assented. At the expiry of the agreement with Messrs. Macdonald and Thompson, the board handed over the management of the mine to Mr. Alexander Hill, who himself installed his representative, Mr. Couldrey, in office. In taking this step the board feel that they have placed the mine under the most capable control procurable, and have also insured that information received by the board will be in accordance with fact. The new manager will not at present commit himself to any figures as to tonnage and values in sight in the mine, as it is impossible to estimate these with any degree of certainty where ore-bodies are so irregular. There is, however, beyond question a very large body of low-grade ore which it is anticipated can be profitably worked by concentration, and, interspersed with it, an appreciable quantity of high-grade ore. It will no doubt be found best to ship ore above a certain grade direct to the smelter, even when the concentration plant is in operation.

"In connection with concentration a number of experiments have been recently made in London as to the suitability of the Elmore oil process to Le Roi No. 2 low-grade ores, and the result has been such as to warrant the directors in giving instructions for the erection of an experimental plant of two units, capable of dealing with 50 tons a day, in the neighborhood of the mine. Should this prove successful the intention is to increase the plant to such a capacity as can deal with the entire output of the mine. The effect of the process, roughly speaking, is to concentrate the mineral contents of ores which are of too low a grade to show a profit on smelting charges. Thus on 6 tons of crude ore producing, say, one ton of concentrates, the smelting charge (according to the present rates) would be $8 instead of $48. There is no doubt, however, that better terms than the present can be made for the smelting of concentrates, as these are a desirable acquisition to any smelter. By the new process, too, the cost of mining will be considerably reduced, as the necessity for hand-picking and sorting will no longer exist, all ore going through just as it comes out of the mine.

"A certain amount of high-grade ore is at present being shipped to the Northport smelter, but till, by the new arrangement, the straightforward stoping of all ore (high and low-grade) becomes practicable, much of the high-grade ore in the mine would be too expensive to handle."

## BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

*Statistics of the State of Tasmania for the Year* 1901. Compiled in the Office of the Government Statistician. Hobart, Tasmania; Government Printer. Pages, 524; with diagrams.

*United States Geological Survey. Contributions to Economic Geology,* 1902. S. F. Emmons, C. W. Hayes, Geologists in Charge. Washington; Government Printing Office. Pages, 450.

*Annual Report of the Department of Mines of New South Wales for the Year* 1902. Edward F. Pittman, Under Secretary for Mines. Sydney, N.S.W.; Government Printer. Pages, 144; illustrated.

*Die Bergwerks-Inspection in Oesterreich.* 1899. *Parts II, III and IV.* Prepared in the Ministry of Industry and Agriculture. Vienna, Austria; Imperial-Royal Printing Office. Pages, 484, 92 and 124, respectively.

*Map of the Province of Manitoba, Canada.* Scale, 12½ miles to 1 inch. Prepared for the Department of the Interior by James White, Geographer. Ottawa, Canada; published by the Department of the Interior. Size of sheet, 26 by 28 inches.

*Experiments on the Flexure of Beams, Resulting in the Discovery of New Laws of Failure by Buckling.* By Albert E. Guy. New York; the D. Van Nostrand Company. London; Crosby Lockwood & Son. Pages, 124; illustrated. Price, $1.25 net.

*Colorado Scientific Society. The Arizpa Meteorite.* By A. F. Wuensch. *The Chemical Assay of Lead Ores.* By A. W. Warwick. *The Separation of Gold from Copper.* By F. R. Carpenter. Denver, Colo.; published by the Society. Pamphlets; illustrated.

*The Utility of an Academic or Classical Education for Young Men, Who Have to Earn Their Own Living, and Who Expect to Pursue a Commercial Life. An Investigation.* Second Edition. By R. T. Crane. Chicago; published for the Author. Pages, 110.

*British Standard Sections of Angles, Tees, Channels, Beams, etc.* Prepared by the Engineering Standards Committee, supported by the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects, the Iron and Steel Institute, and the Institution of Electrical Engineers. New York; the D. Van Nostrand Company. Nine plates, with tables. Price, $1.

## BOOKS REVIEWED.

*History of the Coolgardie Water Scheme, Western Australia.* By Hon. C. H. Rason, Minister of Mines. Perth, W. A.; Government Printer. Pages, 20; illustrated.

This pamphlet is a reprint of an address made by Mr. Rason, who is Minister for Works of Western Australia, on the occasion of the opening of the works which are intended to supply water to the gold-fields of Coolgardie and the adjoining district. Reference has been made in our columns from time to time, to the extensive scheme upon which largely depends the continued work of the gold-fields in the extremely dry region of the eastern portion of the State. The plan dates back to 1895, when Sir John Forrest, the Prime Minister, directed Mr. C. Y. O'Connor, chief engineer of the State, to prepare plans for the supply of fresh water to the Coolgardie District. The plan was gradually worked out, and contracts were let some two years later. Since that time work has been progressing, until it was completed about the close of last year. The water is taken from the rivers in the western part of the State, and the scheme is an extensive one, requiring the damming of a number of streams for the establish-

ment of storage reservoirs and the laying of 328 miles of steel pipe. The quantity of water pumped per day is 5,600,000 gallons, and the maximum lift from the storage reservoir to the main distributing reservoir is 1,290 ft., so that a large amount of power is required. It is, in fact, one of the most extensive water supply schemes in the history of mining, and some interesting engineering work was involved in the construction.

*Mexican Mining Directory.* 1903. *Embracing the Principal Operating Coal and Metal Mines and Metallurgical Plants in the Republic of Mexico.* San Francisco and Denver; Western Mining Directory Company. Pages, 48. Price, $5.

This *Directory* is one of a series which the Western Mining Directory Company is compiling and issuing, the different numbers representing different States, while Mexico is included in one volume. In the directory now before us the arrangement is by States in alphabetical order. Under each State the principal mining districts are given, with the location of the mines in each district. The information given with regard to each mine is very brief, including the names of the manager or superintendent, the description of the mine, whether gold, silver, lead, coal, etc., and a statement showing whether any reduction plant is connected with the mines. It would have been possibly more satisfactory if the plan had been expanded a little, so as to give a few more details with regard to the companies wherever it was possible to do so. We fully appreciate the labor required to collect the information even in the brief form given, but we think it would have added very little to the labor and much to the value of the directory if it had been expanded as we have noted. In some cases also, addresses are lacking. Thus, in the State of Hidalgo, we find a list of haciendas, or reduction works, but it does not state where these haciendas are located, nor does it give the names of the managers. In future editions, we hope that the plan will be somewhat enlarged on the lines we have indicated. In its present form it is very useful, as there is no good mining directory of Mexico in existence, and the increase of our interests in Mexican mines should cause a demand for this one. As to the correctness and completeness of such a work, it is impossible to pass judgment until its facts have been verified by a period of continued use. We are willing to give the compilers full credit for the pains which they have evidently taken, and which are sufficiently indicated by the large number of companies included in the lists.

*Geological Survey of New Jersey. Final Report. Volume V. The Glacial Geology of New Jersey.* By Rollin D. Salisbury; assisted by Henry B. Kummel, Charles E. Peet and George M. Knapp. Trenton, N. J.; State Printer. Pages, 816; with maps and illustrations.

The excellent work done by the State Geological Survey of New Jersey has long been recognized, and the volumes of its so-called *Final Report* are of high value. The present one is the fifth of the series. The first volume included Topography, Magnetism and Climate; the second, Mineralogy, Botany and Zoology; the third, Water Supply, and the fourth, Physical Geography. The glacial deposits of the State received comparatively little attention in the earlier years of the Survey, although some facts regarding them were given in the annual reports of 1877, 1878 and 1880. In 1890, however, an arrangement was made whereby the surface deposits of the State were to be studied and mapped by the State Survey, while the geology of the underlying foundation was to be studied more especially by the United States Geological Survey. Work was then begun on the surface formations by Mr. Salisbury and his assistants, and has been continued up to the present time. The glacial deposits occur entirely in the northern portions of the State, and field work upon them was practically completed in 1894, but the other requirements of the Survey delayed somewhat the preparation and publication of the present report. In the first part the general phenomenon of glacial deposits and glacial epochs are described, the characteristics of the sheet drifts which cover the northern part of New Jersey are given, and proofs adduced of the correctness of the reference of their origin to the ice-sheet; the conditions which determine and control the formation of glaciers, and the manner in which they affect the surface of a region are carefully analyzed. In addition, this part gives a thorough discussion of glaciers and glacial deposits, with more especial reference to those of New Jersey.

The second part is more detailed in character, taking up the chief geological divisions of the glaciers in succession, and describing different deposits, partly by counties and townships, and partly by drainage basins. This part will be of especial interest to the people and land owners of the State, or to engineers who have occasion to do work of any kind in the areas described. Some striking instances of glacial deposits are described and illustrated, such as the great terminal moraine which crosses the Walkill Valley near Ogdensburg, the slopes of the Kittatinny Valley and the deposits of Wallpack township, and in the extreme northwestern portion of the State, along the Delaware. The report is very fully illustrated by maps, by line drawings and by half-tone plates. The maps given are both topographic and geologic, the former representing the form of the surface which in many places is dependent upon the glacial deposits; the latter showing the distribution of the various classes of deposits in typical portions of the State.

The maps, like all those issued by the New Jersey Survey, are of admirable quality. The half-tones have been selected from a large number of photographs taken in the course of field work, and seem generally to have been well chosen, illustrating, in many places, the very striking facts described in the text. Upon the whole, it may be said that the volume is worthy to take high place in the admirable series which have been issued from time to time by the Geological Survey of New Jersey.

*Railroad Construction. Theory and Practice.* Second Edition; Revised and Enlarged. By Prof. Walter Loring Webb. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pocketbook Form. Pages, 692; illustrated. Price, $5.

This is a new edition of a well-known handbook which has been established in the estimation of engineers by several years' use. The present edition has been entirely reset. By changing the size of type, it has been reduced from octavo to pocketbook size, in order to make it more convenient for field use. Several chapters have been added, treating of structures, train-resistance and rolling stock. Large additions have also been made to the chapters on railroad location. These, as the author acknowledges, have been founded largely on the "Economic Theory of Railroad Location," by the late Arthur M. Wellington, than which a better authority cannot be found, for we believe that engineers generally recognize Mr. Wellington's work as one of the most valuable contributions ever made to engineering literature. A number of other additions have been made to bring the book fully up to date, and to embody the latest attainable information.

A LIEBIG CENTENNIAL.—The 12th of May, 1903, being the centennial of Justus Liebig's birthday, a committee arranged a celebration in memory of the illustrious investigator on that day, to which the members of the American Chemical Society, the Society of Chemical Industry, the American Electrochemical Society and the Chemists' Club were invited. Prof. Ira Remsen, president of Johns-Hopkins University, and Prof. William H. Brewer, of Yale University, delivered orations. Dr. C. Duisberg, vice-president of the parent society, Verein Deutscher Chemiker, and Prof. Chas. F. Chandler, of Columbia University, also addressed the meeting. The exercises were held at the Chemists' Club, in New York.

## RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

RIGHTS OF PARTY DEFRAUDED BY REPRESENTATION OF CO-OWNERS IN A SALE.—Where two joint owners of a mining claim with the third part owner induce the latter to convey his interest to another for $2,000, on the representation that such party was to purchase the entire interest for $8,000, when, in fact, such party had agreed that the two first parties should receive in addition $20,000 of the capital stock of a corporation to be organized to operate the mine, the relation between the original owners was such as to require a full disclosure of all the facts concerning the consideration for the sale, and the party defrauded was therefore entitled to a proportionate share of the stock so received. Where the purchasr had merely knowledge of the misrepresentation and concealment on the part of the two co-owners, but did not participate in the distribution and the offer so produced did not enable him to obtain the property at any better price than he otherwise would, a judgment against him for such proportionate share of the profit made by such co-owners was erroneous. —Upton v. Weisling (71 *Pacific Reporter,* 917); Supreme Court of Arizona.

WHEN ONE DOES NOT CONTINUE LIABLE FOR ROYALTIES ON ASSIGNMENT OF LEASE.—The lessees of a mining claim assigned all their interest in part consideration of $1,500, the assignee agreeing "to work said claim and to pay" the lessees the said amount out of the full net profits until said sum should be paid in full to them. After four months diligent working and a loss of several thousand dollars and finding the claim unproductive, the assignee assigned his interest to one who worked it for the remainder of the term, without net returns. It was held that the assignee of the lessees had not by buying this interest rendered himself liable for the payment of the $1,500, the assignment to him not requiring continuous operation, but only reasonable effort to mine at a profit. Also, that where the assignment of a mining lease contained no provision against further assignment, and there is nothing in the character of the work to be performed which involved any relation of personal confidence the assignee has a right to transfer his interest without rendering himself liable for the royalty to the lessees to be paid out of the proceeds, which were never realized.—Caley v. Portland (71 *Pacific Reporter,* 892); Court of Appeals of Colorado.

WHEN ILLEGAL ASSESSMENT WILL NOT BE SET ASIDE AND SALE OF STOCK RESCINDED.—A stockholder of a mining corporation whose duty it was as president, director and business manager, to see that assessments on stock were regularly made and collected, and who knew that it was the uniform practice of the company to levy assessments though the majority of the stock was not represented at the meetings, and though small amounts of previous assessments remained unpaid, could not, after his own stock had been sold under such assessment, complain of the irregularity; and stockholders whose stock had been sold under void assessments, but who with full knowledge of the irregularities made no objection for more than ten months after the last sale, and who repeatedly stated that they had abandoned the enterprise and acquiesced in the forfeiture of their stock, which has meanwhile been bought by innocent parties, were thus prevented from claiming that such sales were void. Where a corporation acts within the scope of its general powers and such acts are irregular and performed in a manner not authorized by its charter, but are neither criminal nor against public policy, they are voidable only, and the stockholder aggrieved thereby may acquiesce in and ratify what has been done, or he may disaffirm and repudiate the voidable proceeding within a reasonable time.—Hatch v. Lucky Bill Mining Company (71 *Pacific Reporter,* 865); Supreme Court of Utah.

## CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

*The Supplementary Report on Cripple Creek.*

Sir.—I take the liberty of addressing you in reference to your editorial in the issue of your JOURNAL dated May 2, entitled "The Supplementary Report on Cripple Creek."

I agree entirely with your conclusions that a re-survey of the Cripple Creek mining district is most desirable and should be supported by those largely interested in the mines of this region. What I particularly wish to point out to you, however, is that you have undoubtedly been misinformed as to the attitude of mining men of the district in this important matter. I gather that the inference of this editorial is that operators in Cripple Crek have not been inclined to encourage the making of this re-survey, and that possibly they did not wish to learn the truth or that they might be afraid of the results. On this point I submit that your information is absolutely the reverse of the truth, as the re-survey has always been most heartily approved. So soon as the mining men knew exactly what was required of them, they set to work to give the matter their earnest moral and financial support.

At this writing the sum of money required to bring about the survey of the district is practically subscribed, the amount lacking being but a few dollars which no doubt will be secured within the next 24 hours. It is quite unnecessary to mention names, but I can state that the list of subscribers include all the prominent individuals, companies and financial institutions interested in the Cripple Creek goldfields. I can say in all sincerity that I have yet to hear the first word spoken to discourage the movement, and will add that the re-survey is now assured.

CLAUDE SACHS.
Editor, *The Mining Investor.*
Colorado Springs, Colo., May 7, 1903.

*The Keith Copper Leaching Process.*

Sir.—A process recently patented by Mr. Nathaniel Shepard Keith, of Arlington, N. J., for the cheap extracting of metals from their ores, if put into practice, bids fair to revolutionize the present methods employed in the making of metallic copper. Mr. Keith makes the following claims in his specification:

"The process of separating the metal from its gangue, which consists in grinding the ore and gangue with carbon; heating the ground mixture in an open furnace, containing an atmosphere of reducing gases to a temperature of the fusion of the particles of ore only; and then submitting the above treated mixture to mechanical concentration to obtain the metal. . . .

"One object of my invention is to so prepare the ores of metals associated with their gangues that their metals may be separated from their gangues more effectively and cheaply.

"I attain this object by grinding the ores and their gangues to the necessary degree of fineness, and after mixing the ground materials with comminuted carbon—such as ground coal, ground charcoal, or petroleum—I heat these in a suitable furnace to the degree of fusion of the particles of ore, or I prefer to grind the carbon with the ores and their gangue, thus forming the mixture by the one operation.

"The full object of obtaining the metals effectively is attained by separating the resulting changed metallic substances from the gangue by any suitable methods of concentration known in the art of metallurgy. . . .

"When ores suitably divided are treated to about their fusion point with carbon or carbon monoxide (CO), they undergo various changes—such as parting with their oxygen, chlorine, carbonic acid and part or all of their sulphur, and reduction to the metallic state of their metals, particles of which last assume a more or less globular shape. This state will occur at a temperature somewhat lower than the temperature at which a fluid state of the metal would be reached when fluxes are used. This globular shape is also taken on by such particles as have not lost their entire amount of sulphur. In this globular shape they have a greater specific gravity than did the particles of original ores. For that reason and the further one that they had not the irregular ragged shapes, they are more readily and effectively separated from the gangues by concentration."

Mr. John Hernan, in his paper on mine fires (*Mining Reporter,* of March 19 last) says the means employed by him in extinguishing the fire in the United Verde mines were:

"A receiver 5 ft. in diameter and 8 ft. in height was constructed and filled with roasted ore from the heap, this ore consisted of oxidized ore lumps the size of a man's first or larger. The hot gases of the burning fuel (coke) were passed through this receiver from top to bottom. The carbon monoxide present reduced the ferric and cupric oxides to ferrous and cuprous oxides being itself oxidized to carbon dioxide.

$$Fe_2O_3 + CO = 2\,FeO + CO_2$$
$$2\,Cu + CO = Cu_2O + CO_2$$

"The reaction was carried further under the influence of heat and much carbon monoxide.

$$FeO + CO = CO_2 + Fe$$
$$CuO + O = 2\,CuO$$

"It was found that all the copper present could easily be reduced to metallic globules of some size, while the iron parted with its oxygen with difficulty, leaving porous metallic iron. In practice very little metallic iron was formed. The copper could be easily concentrated."

This is getting back to first principles. This process was doubtless employed by the ancients. The writer recollects accompanying his father on a mine examination trip, in 1854, to the Lake districts. An Indian guide in answer to questions as by what process the aborigines obtained native copper from oxidized ores, gathered some of that class of ore and kindling a fire of pine wood broke up the ore lumps and fed them to the fire. After some time the fire was extinguished and the shot copper "bumped" out of the ashes and remaining gangue on a piece of curled up birch bark. The Indian informed us that this process had been handed down through his race for generations. It must be admitted that ores of copper can be crushed, roasted in cheaply constructed furnaces with a small percentage of carbonaceous fuel, and the material thus obtained concentrated on the required tables or concentrators, and the product shipped to some finishing works, at a much lower cost than the collection of copper values by the matting-converting process is now accomplished. The risks of "freeze-ups" and other delays peculiar to smelting are fairly obviated. The percentage of coke used will be less and the operations more continuous and satisfactory, and the product of higher grade than blister copper, certainly higher than any regulus or matte made in practice. While it is very probable that the required plant will cost much less to install, than the equipment now necessary to smelting and converting.

JOHN D. BURGESS.
Tucson, Ariz., March 27, 1903.

## QUESTIONS AND ANSWERS.

**Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.**

*Red Oxide of Iron for Pigment.*—Can you tell me where I can find a market and demand for red oxide of iron—or metallic paint as it is commonly called? I have a deposit as near chemically pure as is ever found. About what would it be worth as raw material, just as it comes from the mine?—A. F. H.

*Answer.*—There is a considerable demand for such material. The product, as powdered and prepared for market, brings in the East about $16 per short ton of 2,000 lb. The value at the mine would depend upon the quality; that is, freedom from quartz and other extraneous material, and also freedom from grit or hard material which will not pulverize readily. The value would also be affected materially by the location of the deposit and cost of transportation to market. These factors might reduce the value at mine to $8 or $9, perhaps even to $5.

We advise you to communicate with large dealers in this material; among these we may mention the S. P. Wetherill Company, Philadelphia, and the Ferrous Pigment Company, Cleveland, Ohio. They would probably want samples of the oxide and a statement as to the quantity which could be furnished.

*Location of Mining Claim—Nationality.*—Does the United States mining laws allow to persons of foreign nationality the right to hold and obtain a United States mining patent? And if not, if, for instance, a person of foreign nationality has actually obtained a United States mining patent, what would be the consequence in case this should be discovered and the mine, in the meantime, was put in working order? To whom is the mine legally considered to belong in such a case?—R. D. F.

*Answer.*—The United States mining law on this point appears to be plain. Location of mining claims can be made only by persons who are actually citizens of the United States, by birth or naturalization, or who have declared formally their intention to become citizens—that is, who have taken out what are commonly called their "first papers." The regulations applying to the issuing of patents cover the same point. On applying for a patent, as in filing a location, the applicant must submit proof, either by affidavit or otherwise, that he has complied with the law in this respect, and that he is a citizen of the United States, or has formally declared his intention of becoming so. A person of foreign birth who had not been naturalized, therefore, could only obtain a patent through fraud; that is, he must have made affidavit that he was a citizen, when such was not the case. In that case, the location, or the patent, would evidently be void, and there would be nothing to prevent the claim from being re-located by others, as it would revert to the possession of the United States. Holding a patent purchased from another is, of course, a different matter. After the patent has been issued the claim becomes the property of the legal holder, and can be sold by him to others. Whether an alien could purchase it, depends upon the laws of the different States, some of which permit aliens to hold real property, while others do not.

## ASPHALT FROM PETROLEUM RESIDUE.

Asphalt from the residuum of crude petroleum is a comparatively new industry in the United States, no particular attention having been paid to it until the discovery of oil in California. Being a by-product suitable for paving streets and other purposes for which natural asphalt is used, the California producers of liquid asphalt have organized a selling agency to facilitate competition in consuming markets. This agency is also making efforts to recommend the material to consumers. It is also proposed to improve the quality of the liquid asphalt in hopes of eliminating the unfavorable impression which was made by the inferior grades marketed heretofore. A regular schedule of prices, f.o.b. San Francisco, has been agreed to, which appears reasonable for the Pacific Coast trade. When the high freight rate to Eastern consuming points is added, however, the prices are nearly doubled. This is a disadvantage which will have to be overcome by reducing the cost of production to a minimum. Consideration should also be given to the fact that Trinidad producers who supply the bulk of the increasing consumption in this country, are better situated to meet competition, as they employ cheap labor and pay a comparatively small ocean freight rate to New York or Philadelphia. Still, California enterprise should not be discouraged, because if it does not proof of a financial success it will at least add to the mineral wealth of the State.

## PATENTS RELATING TO MINING AND METALLURGY

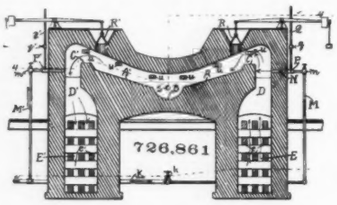
### UNITED STATES.

**The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.**

*Week Ending May 5, 1903.*

726,860. ELECTRIC FURNACE.—Joseph M. Carrere, New Brighton, N. Y. In an electric furnace, the combination with non-rotatable cap ends and supporting-bases therefor, of a cylinder extending between and passing into said cap ends, a lining of a substance of low electrical conductivity within and insulated from said cylinder, means for producing heat within the cylinder.

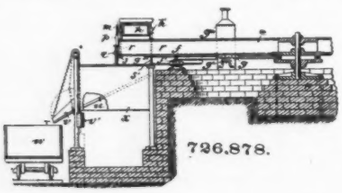
726,861. FURNACE FOR ROASTING AND SMELTING ORES.—Arthur W. Catton, West Seattle, Wash. A furnace having hearths—and a central bullion-well, the hearths of said furnace sloping toward the central bullion-well and having bridge-walls at their outer sides, the top of said furnace being curved above said hearth and above flues leading upward from side superheating-chambers so as to deflect and direct the flames against the ores on the hearths,




charging-hoppers at the point where the flames are directed from the flues to and over the hearths, superheating-chambers at each side of the furnace, superheating-flues leading from said chambers and forming a junction with a smoke-flue, a pivoted gate-damper at the junction of said flues to change the draft alternately from one side of the furnace to the other, and a steam-nozzle within a sleeve-shaped air-intake discharging against said gate-damper and imparting a forced draft to said furnace.

726,871. DOUBLE-CYLINDER SINKING-PUMP.—Edwin M. Coryell, New York, N. Y., assignor to Julia E. Cameron, New York, N.Y. A double-cylinder steam-pump, consisting of the combination with two parallel steam-cylinders and a piston in each working in opposition to a piston in the other, of a single valve-chest and valve in connection therewith and arranged transversely thereto, two passage-ways leading from said valve-chest and each branching to the top of its cylinder and the bottom of the other cylinder, an exhaust-port opening from said valve-chest, said two passage-ways and said exhaust-port being controlled by said valve, two small passages for leading live steam behind each end of the piston-head of said valve for balancing the same by steam-pressure, and a tappet-valve located in the head of each steam-cylinder for controlling said last-named two small passages, and each tappet-valve being itself controlled by its adjacent piston and the steam in its adjacent small passage.

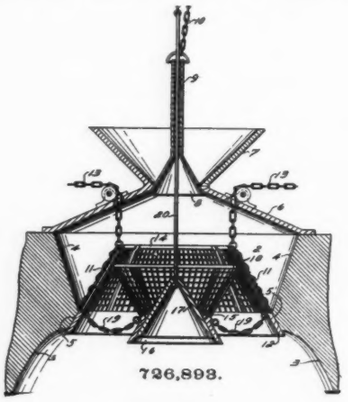
726,878. APPARATUS FOR CASTING METAL.—Roderick W. Davies, Canton, Ohio, assignor to American Casting Machine Company. In apparatus for casting metal and the like, in which the molds are revolubly mounted on a traveling carrier, the improvement which consists in a hood or




divider for the molten metal extending between adjacent molds and normally covering the space between the same, said hood being mounted to travel with the adjacent mold and adapted to hold the same from overturning, and in means which co-operate with the hood or divider for raising it to release the mold to allow it to discharge the cast material.

726,884. PROCESS OF TREATING REBELLIOUS ORES OF THE RARE METALS.—William F. Downs, Jersey City, N. J. A process of treating ores containing rare metals and rebellious elements which consists in intimately mixing the ore with a sodium compound and an agent capable of releasing metallic sodium therefrom, heating the mixture to a temperature sufficient to release the sodium whereby a combination of the sodium with the rebellious elements of the ore results and leaves the metal to be recovered distributed throughout the mass, permitting the volatile impurities and compounds to escape and finally recovering the desired metal from the mass.

726,893. BLAST-FURNACE.—Nickolaus Erzig, Chicago, Ill., assignor of one-half to Peter Huth, Chicago, Ill. In a blast-furnace, the combination of a smelting-chamber




having at its upper end a feed-chute; a bell controlling said chute; a hopper-shaped screen secured within said chamber below said chute; a second bell controlling the discharge of material retained in said screen.

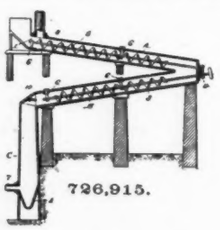
726,899. AGITATOR FOR OIL-WELLS.—Arthur G. Gahagan, Glade Mills, Pa., assignor of one-half to John A. Hughes, Glade Mills, Pa. In an agitator for oil wells, the combination with the working barrel, of a coupling connected to said working barrel and having a receiving-chamber surrounding the same provided with sprayer-jets leading therefrom, said coupling having a valve-controlled passageway therein communicating with said receiving-chamber and revoluble means for opening and closing said passage way.

726,901. EXPLOSIVE CHARGE.—Louis Gathmann, Chicago, Ill., assignor to George Whitman McMullen, Picton, Canada. A mass or unit of explosive material of uninterrupted continuity in the form of a rod or bar, having a central flame-passage and a plurality of exterior flame-passages, said exterior flame-passages being in communication with each other at a plurality of points.

726,902. STONE-SAW.—Cortis K. George and John Burnett, Milford, N. H. A blade for sawing stone comprising teeth of a common thickness throughout their height, arranged at a suitable distance apart, and longitudinal central portions of a less thickness than and corresponding in height to the teeth, arranged intermediate of the same, whereby interdental spaces extending throughout the height of the blade, are formed at either side of the logitudinal central portions for the free passage of abrasive substance to the bottom of a kerf in which the blade is disposed.

726,911. CALCINING OR DECOMPOSING FURNACE.—Wilhelm Hasenbach, Mannheim, Germany, assignor to Verein Chemischer Fabriken in Mannheim, Mannheim,Germany. A calcining or decomposing furnace comprising an iron framework, a hollow casting mounted on the framework for supporting the muffle and serving as a bearing for the shaft of the agitator, a muffle supported on the casting and having an inner hub, an agitator within the muffle supported by the said hub, a shaft for the agitator having a bearing in the hollow casting, and means for operating the agitator.

726,915. CALCINING-FURNACE.—Charles T. Hennig, London, England, assignor to James Robinson Hatmaker, London, England. A furnace in which materials to be treated are brought into direct contact with heated gases, the said furnace consisting of a final vertical stationary empty chamber in combination with a number of chambers above it, all




of the said chambers being connected and so constructed that each successive chamber in the series forms an angle with the chamber preceding it, the said final chamber being of considerable length and having an opening for the admission of heated gases near its lower end so that the materials falling through it may be thoroughly exposed to the action of the heated gases rising through it and having an opening for the discharge of materials at its lower end below the said admission-opening, the first or uppermost chamber in the series having an opening or openings for the escape of the gases and evaporations and the admission of materials.

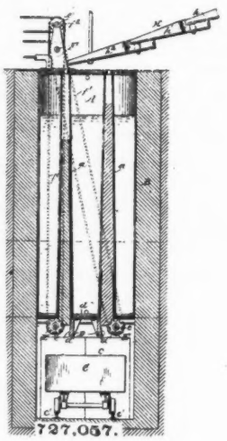
726,948. CENTRIFRUGAL ORE-SEPARATOR.—Gordon Land, Denver, Colo., assignor to O. H. P. Baxter and W. F. Oakes. In an ore-separator, a rotating bowl, a central supply-pipe for the ore to be separated, a centrally-arranged outlet-pipe for the valuable slimes depending through the bottom of said bowl, and an intercepting suspended cylindrical wall interposed between the central discharge and the outer bowl and serving as a means of deflecting the heavy material to its escape-outlet at the surface of the rotating bowl.

726,949. GAS-GENERATOR.—Adolf Langen, Cologne, Germany. In a generator from which gas produced is aspirated by a gas-engine the combination of an ash-box, of an air-conduit leading into the ash-box, of a suction-valve in the air-conduit, of a gas-conduit and of a back valve in the gas-conduit.

726,997. AMALGAMATING DEVICE.—Gerard C. Scott, Columbus, Ohio. In an amalgamator, the combination with an ore-pulp-receiving vessel having an offset or well in its lower side adapted to contain a body of mercury, of amalgamating-bodies contained within said vessel, a movable support for said amalgamating-bodies above the vessel and means connected with said support for raising and lowering said amalagmating-bodies independently.

727,050. FURNACE.—William D. Zehnder, Scranton, Pa. In a blank-heating furnace, the combination of a fire-box, hollow metallic furnace-walls whose inner metallic faces constitute the fire-box walls in direct contact with the burning fuel, means for circulating a cooling medium through the interior spaces of the walls, a feeding-hopper fixedly secured to the furnace and extending downward into the fire-box, and an outtake for the products of combustion, one at least of said furnace-walls having openings for the introduction of blanks.

727,057. SLAG-FURNACE.—Ralph Baggaley, Pittsburg, Pa., and Oliver S. Garretson, Buffalo, N. Y.; said Garretson assignor to Garretson Furnace Company, Pittsburg, Pa. The combination of a boiler or other vessel provided with an upright fire-tube or chamber, means for supplying molten




slag thereto, and a crushing mechanism located beneath the lower end of said tube or chamber and adapted to support the column of congealed slag therein and crush the lower portion of said slag column to gradually remove the congealed slag from said tube or chamber.

727,062. EXPLOSIVE AND PROCESS OF MAKING SAME.—Melvin W. Beardsley, Oakland, Cal. An explosive compound composed of granules of oxygen-bearing metallic salts, carbon, sulphur and corn-oil.

727,072. CLAY-CUTTING SAND-PUMP.—Andrew J. Bramlette, Downey, Cal. A sand-pump comprising the barrel and ring; and a cutter consisting of a sheet of material, the lower end of which is curved vertically and the upper portion of the shank is flanged or angular in cross-section and the outer edge is shouldered toward the inner edge, said shoulder being seated against the ring and the shank fastened to the inside of the ring and barrel.

727,077.—APPARATUS FOR LOCATING METALS, MINERALS, BURIED TREASURES, ETC., WITHOUT DIGGING.—Fred. H. Brown, Los Angeles, Cal. Apparatus for locating metals, minerals, and ores in the earth, the fixed circuit-terminal adapted to be inserted in the earth, a box rigidly attached to said fixed terminal and containing the circuits of the Wheatstone bridge and in circuit with the branches of said bridge, in combination with another circuit-terminal independent of, and freely movable with respect to the fixed terminal; said independent terminal being adapted to be brought into contact with the earth at various and widely-separated points to close electric circuits which include the earth between the fixed and movable terminals and means for measuring the resistance of the earth portions of said circuits.

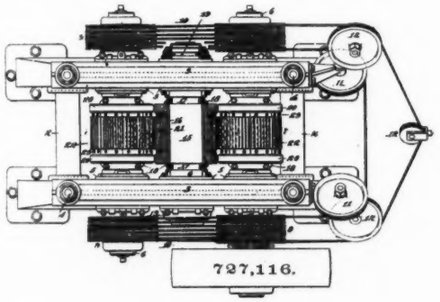
727,088. APPARATUS FOR RETAINING SODA-ASH DUST.—Carl P. Carlson, Langbron, Dingelvik, Sweden, assignor to Adolf W. Waern, Brooklyn, N. Y. The combination with a tank arranged to permit the passage therethrough of gases containing soda-ash dust and adapted to contain a lye solution, of a rotary shaft, imperforate baffle-plates carried thereby arranged in staggered order to cause the gases to pass through the tank around the said plates in tortuous paths and means for alternating dipping the baffle-plates into the lye solution and bringing them into the

path of the gases for collecting the soda-ash dust thereon and conveying it into the solution.

727,095. METHOD OF UTILIZING CALCIUM-CARBIDE REFUSE AND PRODUCT THEREOF.—George E. Cox, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. A method of utilizing calcium carbide refuse, the comminutel and relatively highly conductive waste product of carbide manufacture, which consists in interposing a body of said refuse between electrodes of higher conductivity than the refuse, and passing between the electrodes an electric current of sufficient amperage to convert the body into an ingot.

727,113. APPARATUS FOR MANUFACTURING BRICKS.—Edmund Eaton, London, England. In apparatus for the manufacture of bricks or blocks from sand, lime, ashes and such like, the combined steaming and mixing chamber, comprising a casing or cover open at its lower end and raised or lowered vertically by suitable gear, a vertical steam-pipe passing through a stuffing-box formed centrally with the top of said casing or cover, a revolving platform mounted vertically under said casing or cover, and forming the base of the chamber, a cage or framing mounted upon wheels and supported by said platform, perforated shelves contained within said cage or framing upon which the bricks or blocks are placed, a central perforated pipe within said cage or framing, a sleeve attached to the interior and at the top of the casing or cover and free to slide upon said steam-pipe and engage with the perforated pipe aforesaid, a receptacle for lime formed within the bottom of the cage or framing aforesaid, a perforated receptacle for containing an alkali at the top of said cage or framing a circular perforated steam-pipe carried by the casing or cover and adapted to fit into said receptacle.

727,116. GRINDING-ROLLS.—Thomas A. Edison, Llewellyn Park, N. J. The combination of two rolls having longitud-



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inally-corrugated peripheres, and smooth separating-rims mounted concentrically to each of said rolls and engaging together to effect the separation of the corrugated peripheries thereof.

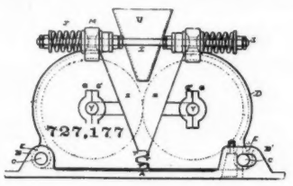
727,118. PROCESS OF MANUFACTURING ELECTROLYTICALLY-ACTIVE FINELY-DIVIDED IRON.—Thomas A. Edison, Llewellyn Park, N. J., assignor to Edison Storage Battery Company, Orange, N. J. A process for making electrolytically-active finely-divided iron, which consists in reducing a compound of iron by hydrogen in the presence of heat, then in cooling the reduced mass, and finally in flooding the reduced mass with water to prevent atmospheric oxidation.

727,140. MINE MODEL OR EXHIBIT.—Nathaniel P. Hill, Colorado Springs, Colo., and John R. Chamberlain, New York, N. Y., assignors to Hill-Chamberlain Manufacturing Company. A transparent mine model or exhibit consisting of two or more plates of glass or transparent material suitably clamped together, the upper plate or plates being ground or shaped to show the superficial outline of the land below which the mine is located, the said plates being perforated vertically or at angles to represent the mine shaft or incline, and the veins and dikes which traverse the mine, and being provided with horizontal cuttings to illustrate the drifts or tunnels at various levels below the surface.

727,151. SURVEYOR'S ROD.—Willie L. E. Keuffel, Hoboken, N. J., assignor to the Keuffel & Esser Company. A surveyor's rod composed of three sections of which the lower and upper ones are located at opposite faces of the middle section, said middle section having its opposite sides grooved longitudinally, guiding means projecting from the the lower section and engaging said grooves and a clamping and releasing means carried by the upper section and also engaged with said grooves.

727,160. APPARATUS FOR CONSTRUCTING ASPHALT PAVEMENTS.—Harry W. Laster, Chicago, Ill., assignor to The Barber Asphalt Paving Company, Washington, D. C., and New York, N. Y. An apparatus for the purpose set forth comprising, in combination with a suitable vehicle, a heating-chamber for the binder material, means for heating said chamber, a horizontally-swinging discharge-pipe leading from said chamber and provided with a nozzle having a narrow, generally horizontal discharge-orifice, means for swinging said discharge-pipe horizontally at the time the binder material is being discharged therefrom, and means for applying a fluid under pressure for forcibly discharging said binder material through said pipe and nozzle.

727,177. CRUSHING ROLLS.—James H. Montgomery, Denver, Colo. A base-frame having boxes on both end, and carrying shafts; two movable roll-carrying housings, having boxes on their lower part, and lugs on their upper part, journal-boxes and caps, and segmental gear-teeth, each



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housing carrying a crushing-roll; spring-rods, springs, and a feed-hopper.

727,183. MINE-CAR WHEEL.—Edward E. McConnell, Pittsburg, Pa., assignor of two-thirds to Simon D. Lauffer and James K. Gallagher, Irwin, Pa. A wheel having a cast-metal hub formed with a chilled journal-bearing of uniform diameter throughout its length.

727,184. METHOD OF TREATING REFRACTORY ORES. Robert McKnight and Moses Satarasky, Philadelphia, Pa.; said Satarasky assignor to Finley Acker, Philadelphia, Pa. The art of treating ores containing metalloids which consists in roasting the ore with access of air and agitation but shut off from products of combustion, until an oxide of the metalloid is formed and passes off, together with the metal in the ore in a finely-divided state, collecting the fumes arising from the ore, in a receptacle containing a solution of a chloride of an alkaline or alkaline-earth metal and converting in said receptacle, the oxide of the metalloid into an acid, and replacing the hydrogen of the acid with the alkaline or alkaline-earth metal, and setting free nascent chloride, and fforming a chloride therewith of the metal values, in a finely-divided state.

727,230. LEACHING-TANK FILTER.—Frank G. Underwood, Pluma, S. D. A tank having an interior filter-diaphragm spaced from the bottom thereof, in combination with filter members vertically disposed within said tank and communicating with the space beneath said filter-diaphragm, and feed-pipes for the dissolving solution alternating with said vertical filter members.

727,262. GOLD-DREDGER.—Omer F. Barnes, Arcola, Ill. In a dredger, a suction-tube and a collecting-plate supported and spaced below the inlet of the tube, the plane of said plate being extended in all directions from the end of the tube and parallel therewith.

727,266. PROCESS OF PURIFYING GAS.—James A. Bellon-Lencauchez (called J. A. Lencauchez) Paris, France. A process of purifying gas consisting in intimately commingling the gas with a washing liquid by simultaneously agitating the gas and liquid together by centrifugal force causing the gas and liquid introduced at or near the center of rotation to move in the same direction on from the center toward the circumference with relation to the axis of rotation and the liquid to be atomized and intimately mixed with the gas.

727,291. APPARATUS FOR HANDLING SHEET-METAL PLATES.—Oliver Clark, Newcastle, Pa., assignor of two-thirds to John Baxter, Newcastle, Pa., and Charles Hillman, Middletown, Ind. In apparatus of the character described, a carrier, and electro-magnets arranged transversely of the carrier each having a plurality of pole-pieces in its length, substantially as described.

727,297. APPARATUS FOR PRODUCING ZINC-DUST.—George G. Convers and Arthur B. de Saulles, South Bethlehem, Pa. An apparatus for the recovery of zinc-dust or blue powder, comprising a plurality of muffles arranged at different heights, a furnace for heating the same externally, and an expansion-chamber common to the series, the rear wall of the expansion-chamber being formed by the front wall of the combustion-chamber, thereby providing direct and jointless communication between the muffles and expansion-chamber, said expansion-chamber being of such capacity relatively to the retorts as to immediately expand and solidify the zinc-vapors into zinc-dust.

727,298. APPARATUS FOR PRODUCING ZINC-DUST.—George G. Convers and Arthur B. de Saulles, South Bethlehem, Pa. Apparatus for the recovery of zinc-dust or blue powder, comprising a zinc-distilling muffle, a furnace for heating the same externally, and a collecting and expansion chamber immediately adjacent to the muffle and of such relative size and capacity as to be kept heated by the zinc-vapors and to precipitate said vapors therein in their substantial entirely as zinc-dust.

727,362. APPARATUS FOR TREATING ORES.—Henry Hirsching, San Francisco, Cal. An ore-treating apparatus including a leaching vessel, a settler, a filter, a still, a limestill, a tank containing a condensing-coil, an absorption-tank for vapors, a stock-solution tank, a water tank, and a boiler to supply heat to the first-mentioned still, the so-produced vapors from the still being partially condensed in the coil-tank, and the vapors not condensed therein being absorbed in the said absorption-tank, said parts being connected together by means of pipes.

727,416. CONVEYOR AND SHIELD USED IN CONNECTION WITH CRUCIBLE SMELTING-FURNACES.—Patrick J. McDonald, Pittsburg, Pa. The combination with the track, of a traveling carriage mounted on said track and carrying a body having a passage-way therein adapted to receive the operator, an auxiliary track carried by the traveling carriage, a crane on said track, said crane operating in a plane transverse to that in which the carriage operates, a brake mechanism carried by the traveling carriage and adapted for engagement with said track, and means whereby said brake mechanism may be actuated by the operator.

727,441. APPARATUS FOR TREATING ORES.—Thomas L. Rankin, Sacket Harbor, N. Y. In ore-roasting apparatus, a rotatable cylinder provided with ore-treating surfaces formed by two series of long and short inwardly-extending wings, the wings of the shorter series being made to alternate with those of the longer series, and to terminate far enough from the center of the cylinder to leave spaces between them and the adjacent longer wings, about equal to the spaces between the inner termini of the longer wings.

727,457. APPARATUS FOR THE CONTINUOUS PRACTICE OF ELECTROLYTIC PROCESSES.—Pedro G. Salmon, Philadelphia, Pa. In an electrolytic cell, means for evenly spreading over the surface of one of the electrodes, without interruption of the process, a coating of a material which is to be acted upon or transformed by the electrolysis.

727,471. COMBINED ELECTROLYTIC AND MECHANICAL INTERRUPTER.—Horace R. Smith, Altoona, Pa. A combined electrolytic and mechanical interrupter, comprising an electrolytic interrupter capable of acting as a condenser and a mechanical interrupter, said interrupters having independent periods of interruption and being normally connected together in series, and means, controllable at will, for connecting said interrupters in parallel.

727,489. BRICK-MACHINE.—Arthur L. Symmonds and Marlin T. Symmonds, Colorado Springs, Colo. In a pressed-brick machine the combination with the gate and table, of a metallic spring scraper or brush attached thereto by means of arms and hinged bars, having slots and bolts allowing ready adjustment.

727,506. ASPHALTUM AND ITS MANUFACTURE.—Frederick J. Warren, Newton, Mass. An asphaltum for paving and other uses consisting of a mixture of such asphaltums as are hard and have great wearing qualities with a flux of heavy permanent hydrocarbon oil from another asphaltum.

727,507. ASPHALT COMPOSITION AND ITS MANUFACTURE.—Frederick J. Warren, Newton, Mass. An asphalt mixture containing asphalt in combination with lampblack.

727,532. AUTOMATIC CATCHER FOR SHEET OR TIN-PLATE MILLS.—Charles W. Bennett, Elwood, Ind., assignor to American Tin Plate Company, New York, N. Y. The combination, with rolls for producing sheet metal, of a receiving-platform arranged back of said rolls to receive the product from between the rolls, means for projecting said platform above and over the upper roll within reach of the roller and for returning said platform to receiving position, and means for automatically inclining said platform to a position where the finished plate may slide therefrom.

727,540. ROASTING OR DRYING APPARATUS.—William Harvey, Denver, Colo. In a roasting or drying apparatus, the combination of a hollow revoluble cylinder provided with an interior conveying-thread composed of distinct co-operating sections of material adapted to resist the action of the heat.

727,549. CATHODE-HOLDER.—Joseph Matthews, Birmingham and William Davies, county of Worcester, England. A cathode-holder for electrolytic purposes characterized by the lower extremity of the cell-like laterally-open cathode-holder being provided with a trough-like receptacle to receive the metal falling from the cathode.

## GREAT BRITAIN.

**The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:**

*Week Ending April 18, 1903.*

6,486 of 1902. OPEN-HEARTH FURNACE.—O. Thiel, Kaiserslautern, Germany. Stationary open-hearth furnaces with several tapping-holes at various levels, so that varying amouuts of the charge may be withdrawn.

6,727 of 1902. DESULPHURIZING IRON.—W. Joukoffsky and P. de Strouve, St. Petersburg, Russia. Desulphurizing iron by adding salt to the charge and to the lining of the converter.

8,128 of 1902. COAL-DRILL MOUNTING.—F. W. Hurd, Bothwell, Scotland. Improved method of mounting a rotating coal drill on an upright fixed to the roof and floor.

9,327 of 1902. TREATING ZINC RESIDUES.—H. E. Howard and G. Hadley, Birmingham. Improved method of treating zinc residues from galvanizing works and spent acids, and for producing zinc oxide therefrom.

9,745 of 1902. MINER'S PICK.—W. Bradley, Sheffield. Improved sockets for miner's picks and means for securing the blades.

14,615 of 1902. FUME-CATCHING HOOD.—W. Lynes, Birmingham. Improved hood for metallurgical and crucible furnaces for catching the fumes.

24,366 of 1902. OIL FUEL FOR METALLURGICAL FURNACES.—H. E. Vosburgh, New York, U. S. A. System of using oil fuel for metallurgical reduction furnaces.

## ANNOUNCEMENT.

We find it desirable to state that the company owning THE ENGINEERING AND MINING JOURNAL has not purchased and will not purchase *The Pacific Coast Miner*, with which publication intimate relations have been maintained for the past four months. The ENGINEERING AND MINING JOURNAL is in a particular sense the organ of the mining and metallurgical professions of America, and while we wish well to all those who are doing good work in their respective fields of activity, it is found inexpedient to form an alliance with any local paper anywhere.

## TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

## PERSONAL.

Mr. A. H. Bromly has returned to London from India.

Mr. E. Van Cortlandt, of Denver, is now in New York City.

Mr. Charles Abbott has returned to Denver from Tonopah, Nev.

Mr. H. R. Wagner sails from New York on May 19 for London.

Mr. E. G. Spilsbury, of New York City, has gone to Guanajuato, Mex.

Mr. George W. Maynard has returned to New York City from Idaho.

Mr. James Douglas returned to New York on the *Ivernia*, arriving on May 11.

Mr. A. Cyril Boyce, of Sault Ste. Marie, Ont., was in New York City on May 11.

Mr. S. D. Bridge, of Monterey, Mex., is in New York City on important business.

Mr. Thomas L. Darby, of Denver, has been at Los Angeles, Cal., and Prescott, Ariz.

Mr. H. B. Alexander, of Sandon, B. C., had been in New York City during the week.

Mr. John D. McGillivray is in New York City en route from London to the Klondike.

Mr. A. De Lautreppe, of New York City, has returned from Cerro de Pasco, Peru.

Mr. C. L. Wright sailed from New York May 6 on his way to Medellin, Colombia.

Mr. William R. Todd, of New York City, recently visited the Lake Superior copper district.

Mr. George W. Peirce, of Denver, has returned from a professional journey to Boise, Idaho.

Mr. Fred F. Sharpless will be at Colon on May 25, en route to examine mines in Colombia.

Mr. Henry C. Callahan, of San Francisco, sailed from New York on the *Kronprinz Wilhelm* on May 12.

Mr. A. W. McCune recently returned to Salt Lake City after a trip to the Cerro de Pasco mines, in Peru.

Mr. Arthur W. Jenks has been appointed manager of the White Knob Copper Company's mine at Mackay, Idaho.

Mr. W. Randolph Van Liew, manager of the Old Dominion Copper Company, Globe, Ariz., has been at Denver.

Mr. John B. Farish has returned to Denver from Los Angeles, Cal., but will be going thither again shortly.

Mr. Frank Pratt, who for the past 12 years had charge of the De La Mar Mill, near Silver City, Idaho, has resigned.

Col. H. H. Gregg, of Joplin, has been appointed superintendent of the Missouri mineral display at the World's Fair.

Mr. C. J. Garvin, of Denver, has been appointed superintendent of the Neglected Mining Company at Durango, Colo.

Mr. Bela Kadish and family will leave Baker City, Ore., about May 15, expecting to sail from New York about June 1.

Mr. Henry G. Catlin, of New York City, has returned from an inspection of mines near Parral, in Chihuahua, Mex.

Mr. Ben T. Lloyd, manager of the Copper Mountain Mine, Beaver County, Utah, is in Chicago on mining business.

Mr. F. W. Sherman, manager of the Daly West Mill, at Park City, Utah, is also to have charge of the Daly-Judge Mill.

Mr. M. L. Effinger, director of the Wolverine Mine, of Park City, Utah, has returned to Salt Lake from Calumet, Mich.

Mr. A. J. Davis, who is interested in the Trade Dollar Extension, of Silver City, Idaho, has returned to Salt Lake from New York.

Mr. James Colquhoun, consulting engineer of the Arizona Copper Company, has returned to Clifton, Ariz., much improved in health.

Mr. T. H. Oxnam, who resigned as manager of the Palmarejo mines, Mexico, some months ago, has been reappointed general manager.

Mr. George E. Tener, of Pittsburg, Pa., a director of the Calumet & Arizona Mining Company, recently examined the mine at Bisbee, Ariz.

Mr. G. C. Hewett, mining engineer, of Denver, until May 20 will be in the East. His address is Wyncote, Pa., care Charles Hewett.

Mr. Allen Kinkhead, formerly of Virginia, Nev., recently was appointed manager of the Angels Deep Mining Company, Boksburg, Transvaal.

Dr. Buckley, State geologist of Missouri, has begun the study of the disseminated lead deposits of that State for the Missouri Geological Survey.

Mr. W. C. Brace, mining engineer, of Denver, Colo., passed through Salt Lake City a few days ago, while on a professional trip to Montana.

Mr. E. W. Davis, of Central City, Colo., who is interested in mining properties in Gilpin County, has returned from a trip to the Pacific Coast.

Mr. Fred Morgan, manager of Merton's Reward Mine, in West Australia, passed through New York City, en route to London, during the week.

Mr. Richard Blackstone, formerly chief engineer at the Homestake Mine, Lead, S. D., is now assistant superintendent under Mr. Thomas J. Grier.

Mr. Charles Briggs, president of the Calumet & Arizona Mining Company, has returned to Calumet, Mich., after a visit at the mine at Bisbee, Ariz.

Mr. Peter Ruppe, of Calumet, Mich., treasurer of the Calumet & Arizona Company, has returned from a trip to Bisbee, Ariz., where he examined the mine.

Mr. Harrington Blauvelt, of the Chase, Monte Cristo and Catoctin mining companies, Arizona, with headquarters at Phœnix, is in the East on a business trip.

Mr. Harrison Clement, in the employ of the Bingham Consolidated Mining Company, is now superintendent of the Eagle and Blue Bell mines at Eureka, Utah.

Justice G. W. Bartch, of the Utah Supreme Court, has returned to Salt Lake from an inspection of the Sheba Mine in Humboldt County, Nev., of which he is president.

Dr. J. A. Holmes, chief of the department of mining and metallurgy at the St. Louis World's Fair, has gone to Pittsburg and New York City on World's Fair business.

Mr. H. F. Fay, of Boston, Mass., president of the Trimountain, Centennial, Allouez, Old Colony and other Lake Superior copper mines, is visiting the properties under his management.

Mr. Blanchard M. Snyder, who has been chemist and assayer at the Granby Smelter, has accepted a similar position with the British Columbia Copper Company at Greenwood, B. C.

Col. George W. Crowe, general manager of the Arizona Gold and Copper Company, has been in Guaymas, Mex., on business connected with the smelter to be erected at that place.

Mr. William S. Gage, who has for some time been in Alaska, has become connected with Mr. George Mitchell as consulting mining engineer, with offices in the Bradbury Building, Los Angeles, Cal.

Mr. Charles H. Gitsch has resigned the superintendency of the California property at Park City, Utah, and intends to devote his time to his lease on the old Woodside property, below the Silver King.

Messrs. J. Van Nostrand Dorr and A. D. Wilson, interested in the Black Hills, S. D., passed through Denver a few days ago on their way to Utah to look over the metallurgical enterprises of that State.

Among the members of the Royal Commission appointed to stimulate English interest in the St. Louis Exposition are Dr. C. Le Neve Foster, Prof. C. V. Boys, Mr. Boverton Redwood and Mr. J. J. Teall.

Mr. Ivan Ragaz, superintendent of the Sierra Mojada and Santa Eulalia mines for the Guggenheim Company, recently resigned to become manager of the Stilwell mining interests, with headquarters at Chihuahua, Mex.

Mr. H. H. Claudet, representative of the Elmore Oil Process, was recently in San Francisco, Cal., procuring machinery for a 50-ton oil ore concentrating plant, which he will put in at Le Roi No. 2, Rossland, B. C.

Mr. J. B. Nau, the metallurgist, formerly connected with the management of a number of American steel plants, has established himself as consulting metallurgical and mechanical engineer, at 1 Broadway, New York City.

Prof. R. S. Miller, formerly associate professor of mechanical engineering at Purdue University, has been elected to a similar position in the newly organized department of engineering at Colorado College, Colorado Springs.

Mr. E. R. Woakes, lately at Nelson, B. C., has been appointed general superintendent of the lead mines and smelters in Spain, of which John Taylor & Sons (London) are the managers. Mr. Woakes will reside at Linares.

Prof. J. Morgan Clements, recently connected with the geological departments of Wisconsin, has resigned that position and also one he held with the United States Geological Survey. He intends soon to open offices in New York City.

Mr. James Bresnahan, superintendent of the Republic Consolidated Gold Mining Company, resigned recently. Mr. W. J. Casey, who, under the former manager, Mr. R. G. Edwards-Leckie, was superintendent, has been reappointed.

Mr. Samuel James, recently superintendent of the Arkansas Valley Smelter in Leadville, and a former superintendent of the Globe Smelter in Denver, will be general superintendent of the smelter at Salida, Colo., and also of the Republic Smelter at Leadville.

Mr. William N. Nisbet, formerly superintendent of motive power of the Queensland Government Railways, and who now represents the Westinghouse Air Brake interests in Australia, sailed recently from San Francisco after a short business visit to this country.

Mr. Blanchard M. Sydney, of Anaheim, Cal., has been appointed assayer and chemist at the British Columbia Copper Company's smelter at Greenwood, B. C., to take the place of Mr. Gustave Sandberk, who has gone to Sand Point, Idaho, in the employ of Mr. Paul Johnson.

Mr. Charles M. Schwab was unanimously re-elected president of the United States Steel Corporation at a meeting of the directors, held recently in New York City. All the old officers were re-elected, Mr. John F. Dryden, of New Jersey, being chosen a director to succeed the late Abram S. Hewitt.

Mr. Thomas Gilmour, late manager of the Waihi Mine, and now consulting engineer to the Waihi Company, has left Waihi for a visit to America and the British Isles. Mr. Gilmour is bound to San Francisco, and after visiting the State of Nevada, will proceed by way of New York to Great Britain.

Mr. W. E. Defty, of Phœnix, Ariz., who was injured by falling down a winze at the old Las Planchas de Plata Mine several weeks ago, is now in the field again. He has left for the Arispe and Altar Districts in the State of Sonora, and will proceed from there to the State of Michoacan in the southern part of Mexico.

Dr. Charles R. Keyes, consulting geologist to the Santa Fe Central Railroad Company, has submitted his report on the coal fields of the Ortiz Mountains. He pronounces these fields the most extensive in the Southwest. As a result, two lines of railroad to the district will be built, on which grading is already well along.

Mr. M. L. Jenkins, former superintendent of the machine shops of the Fairbanks-Morse plant, at Beloit, Wis., has been appointed superintendent of the Allis-Chalmers plant, West Allis, Wis. Mr. Jenkins succeeds Mr. Frank Davis, who resigned recently to accept a position with the Westinghouse Electric and Manufacturing Company.

Mr. Paul Johnson, late general manager of the British Columbia Copper Company's smelter at Greenwood, B. C., has accepted a position with the Brown Alaska Company, of 11 Broadway, New York, and will design and build a copper smelter on Prince of Wales Island, Alaska. This will be the first smelting plant in Alaska. Mr. Johnson, who built what is said to have been the first successful copper smelter in British Columbia, at Nelson, will have charge of the new works on Prince of Wales Island when completed, probably about January 1, 1904.

## OBITUARY.

George W. Amsden, of Litchfield, Ill., of the Litchfield Car and Machine Company, and a wealthy mine owner, died May 9 at the age of 60 years. During the Civil War he served in an Illinois regiment and later in the United States Navy.

Col. W. H. Dewey, one of the prominent mining men of Idaho, died of dropsy at Nampa, Idaho, on May 8. He was 80 years of age, and a native of New York. Col. Dewey made a fortune in the mines of Silver City, and recently developed the Dewey Mine at Thunder Mountain. His estate is valued at over $1,000,000.

Capt. William H. Rodda, manager of the Associated Northern and other mines at Kalgoorlie, West Australia, according to a cable message received at this office, died on May 9. Capt. Rodda was a native of Cornwall, who had been mine superintendent at Grass Valley, Cal., and elsewhere in the West before he went to Australia, where he gained a reputation for capacity and energy as a mine manager.

Robert N. Hartman, professor of analytical chemistry at the State School of Mines, Golden, Colo., was asphyxiated by hydrogen-sulphide gas in the generating room underneath the laboratory on the afternoon of May 8. Prof. Hartman was born at Ghent, N. Y., April 13, 1872. Subsequently his parents removed to Baltimore, Md. He graduated from Chambersburg Academy in 1887, from Pennsylvania College in 1891, and from Johns Hopkins University in 1894. After graduation until 1896 he was professor of natural science at Susquehanna College at Selvin's Grove, Pa. From 1896 to 1899 he was instructor in analytical chemistry, and assistant to Dr. Arthur Michael, at Tufts College, Mass. In the fall of 1899 he became professor of analytical chemistry at the Colorado State School of Mines. He was a general favorite among the students. His widow and two small children survive him.

## SOCIETIES AND TECHNICAL SCHOOLS.

SYRACUSE UNIVERSITY.—The catalogue for the current year of this Institution at Syracuse, N. Y., shows the total enrollment of students, including those in all departments, and in the summer school as 2,009, of whom 183 are in the college of applied science, and 905 in the college of liberal arts. The great majority of the students are from New York, though many States and several foreign countries are represented.

The College of Applied Science offers courses in civil, electrical and mechanical engineering, leading to the degrees of Civil Engineer, Electrical Engineer and Mechanical Engineer.

ENGINEERS' CLUB OF PHILADELPHIA.—At the meeting on May 2 Rear Admiral George W. Melville read a paper on the "Military Importance of Naval Engineering Experiments," in which he called attention to the surprising rise of Germany as a maritime and naval power during the past 30 years as a result of experimental work and investigation, and contrasted the desultory and sporadic manner in which naval work has been carried on in England and America.

For the past eight years the Bureau of Steam Engineering of the United States Navy Department has had in contemplation the establishment of such an experimental plant, as the Navy is behind the times in original work and research. The field to be covered is vast, and Admiral Melville gave a few of the many urgent problems, in the solution of which the Navy has a direct interest. The primary reason and chief object for establishing the laboratory is to increase the efficiency of the Navy by preventing the adoption on ships-of-war of untried or doubtful devices and expedients.

Messrs. William B. Cavin, David S. Creswell, Robert F. Scott, C. W. Thorn and A. C. Wood were elected to active membership, Messrs. H. G. Perring, William H. Taylor, Jr., and D. Robert Yarnall to junior membership, and Mr. S. Jones Phillips to associate membership in the club.

There were 130 members and visitors present at this meeting.

## INDUSTRIAL NOTES.

The Niles-Bement-Pond Company has appointed the firm of Noyes Brothers, of Sydney and Melbourne, its exclusive representative in Australia.

The B. F. Sturtevant Company is operating its new foundry at Hyde Park, Mass., where the big machine shops are nearing completion.

It is reported that the output of the Baldwin Locomotive Works for April was 191 locomotives, the largest month's total in the history of the works.

Machinists in the employ of the Carborundum Company, Niagara Falls, went on strike recently, thus closing one department of the plant. The men demand a 9-hour day.

The stockholders of the International Silver Company held an adjourned regular meeting in Jersey City recently and elected three new directors, Andrew Andrews, C. Berry Peets and L. E. Stevens. The 12 other members were re-elected.

The Norton Emery Wheel Company, of Worcester, Mass., is about to erect a large storage building for raw material at its Niagara Falls plant, where it manufactures artificial corundum. Several new furnaces have recently been added to the plant, and a new building erected to increase the crushing capacity.

At a recent conference between the structural iron workers and the management of the Colorado Fuel and Iron Company, no satisfactory terms of agreement could be reached, and accordingly a strike was declared. Over 300 men were affected, and the structural iron department of the company is reported seriously crippled.

The Lunkenheimer Company, of Cincinnati, reports that on account of the unprecedented demand for its line of brass and iron steam specialties, it has been compelled to increase its foundry output 50 per cent. Machine tools of the most improved type are being installed in various departments as fast as they can be obtained.

The Otis Elevator Company is to install eight high-pressure inverted plunger hydraulic passenger elevators in the Bessemer Building, Pittsburg, and in the Phipps power house adjacent thereto. These elevators are of the same type as those in the Prudential Building in Newark, N. J., and those to be installed in the new Metropolitan Life Building in New York City.

The Plunger Elevator Company, of Worcester, Mass., has sold, through its New York office, 156 Fifth Avenue, an elevator with a lifting capacity of 14,000 lbs., to a manufacturing company in Camden, N. J. The elevator will carry loaded cars from one floor to another, the total travel being 24 ft. No counter weights, or cables, will be used.

The property of the Worcester Steel Works, Worcester, Mass., was sold recently. John A. Bowers, of Bayonne, N. J., was the purchaser, bidding $36,000 and assuming the mortgages amounting to $80,000. The property consists of several old buildings and above five acres of land. The works were started in the 40's, and for many years manufactured steel rails.

The Loomis-Pettibone Company, of New York, has lately secured a contract from the Velardena Mining and Smelting Company, of Velardena, Durango, Mex., for a 2,000-h.p. gas engine plant, which will be utilized for operating from a central power station an ore concentrating mill, pumps and hoists at six of the mines which are located within a radius of 10 miles.

The Silver King Mining Company, of Park City, Utah, has written the F. D. Cummer & Son Company, of Cleveland, O., manufacturing Cummer dryers, the Cummer handling system and the Cummer dust collector, that a Cummer dryer in operation at this mine for eight months is running steadily and drying mill concentrates satisfactorily.

The American Refractories Company, of Harrisburg, Pa., organized to consolidate practically all of the independent manufactories of silica firebrick and clay products, in all about 40 concerns, has taken out a charter. The nominal capital is only $5,000, but when the organization of the company is complete this will be increased to $20,000,000. The incorporators are: Treasurer, Frank Pittfield, Pittsburg; directors, George M. Hosack, John W. Boileau, Frank Pittfield, Pittsburg; S. M. Myers, Wilmerding, Pa.; M. H. Hosack, Wilkinsburg, Pa.

At the annual meeting of the stockholders of the General Electric Company, held at Schenectady May 12, the number of directors was increased from 13 to 15. The new directors appointed were Governor William M. Crane, of Massachusetts, and William C. Whitney, of New York. The following directors were re-elected: Gordon Abbott, Oliver Ames, C. A. Coffin, T. Jefferson Coolidge, Jr., Frederick P. Fish, George P. Gardiner, Eugene Griffin, Henry L. Higginson, J. Pierpont Morgan, J. P. Ord, Robert Treat Paine 2d, George Foster Peabody and Charles Steele.

At a recent meeting of the board of directors of the Illinois Steel Company, C. H. McCullough, Jr., was elected second vice-president, charged with the supervision of general construction, with headquarters at the general offices in the Rookery Building, Chicago; George L. Reis was appointed general superintendent of the South works of the Illinois Steel Company by President E. J. Buffington, with offices at South Chicago, vice C. H. McCullough, Jr., transferred. The president also appointed R. B. Charlton general superintendent of the Milwaukee works, with offices at Milwaukee, Wis., vice George L. Reis, transferred.

The Union Iron Works, of San Francisco, is installing a power transmission plant near Reward in Inyo County, Cal., to transmit power electrically, about 2 miles to the mill of the Reward Gold Mining Company, where induction motors will be used to drive a 20-stamp mill, an air compressor and a rock breaker. The apparatus, which has been purchased from the Westinghouse Electric and Manufacturing Company, includes a 120-kw. 3-phase alternator; a 2-h.p. exciter; a type No. 6 switchboard panel, including voltmeters, ammeters, rheostats, etc.; two 50-h.p., type C induction motors, complete with auto-starters, slide rails, etc.; a 15-h.p. induction motor; three 7½-kw. transformers; two 1-kw. transformer, and eight lightning arrester units. The transmission will be at 2,200 volts.

The Holthoff Machinery Company, of Cudahy, Wis., reports business good. Many improvements are contemplated for the coming year. The company has enough orders booked to keep it busy for several months, and during April took $100,000 worth of business. The demand for machinery comes from all over the United States and from Mexico, South America and British Columbia. It recently took a large contract from the Pikes Peak Hydro-Electric Company for steel riveted pipe to be erected near Colorado Springs, Colo.; for machinery for the Old Dominion Copper Company of Arizona; a combination mill, stamps and concentrating machinery for the Wisconsin-Mexico Mining Company, of Sonora, Mex., and a 2-stamp mill for the Rosetta District Development Company, at Hailey, Idaho.

The Allis-Chalmers Company says that A. Rieppel, of Nurnberg, Germany, the managing director of the Augsburg Nurnberg Manufacturing Company, one of the largest and most successful builders of structural iron work, engines, cars, bridges, etc., in Europe, is now visiting this country for the first time. His works employ about 16,000 men, and now have over 2,000 at work on the bridges, etc., of the new railroads being built by Germany in China. The Augsburg-Nurnberg Company has long built its engines in smaller units up to 400 h.p., and operated with petroleum, but for the use of waste gas as well as producer gases and in larger units, it has recently developed an entirely new design as the result of many years' experience. The engine which is of the double-acting cycle type, generally in tandem arrangement, is best adapted for the various purposes of modern power development up to the largest units required by municipal central stations and iron and steel works. Mr. Rieppel's visit was to interest the Allis-Chalmers Company in the manufacture of the products of his company, and by mutual agreement to enable each or either to get in closer touch with the requirements of the trade throughout the world. A contract was entered into by the two companies giving the Allis-Chalmers Company the exclusive right to manufacture and sell the Nurnberg gas engine for this country and selling rights in many foreign countries, especially the far East and South Africa. The Augsburg Nurnberg Manufacturing Company, under the direction of Mr. Rieppel, has within the past few months received orders for some 50,000 h.p. throughout Germany and Spain, chiefly for generating electric energy and for blast furnace and spinning mill work. Mr. Rieppel is now on an inspection trip throughout this country, and will visit the new works of the Allis-Chalmers Company at West Allis, Wis., where the engines will be built.

## TRADE CATALOGUES.

One of the pamphlets issued by the Ft. Wayne Electric Works, of Ft. Wayne, Ind., is entitled "Perfection in Transformer Insulation." It calls attention to the merits of the company's Type A transformers.

A circular sent out by Keuffel & Esser, of New York City, describes that firm's new builders' transits, suited for engineering and surveying work which does not require the extreme of accuracy. The transits are light, weighing with compass about 7¾ lbs. The list price ranges from $85 to $120, according to the extras furnished.

The Denver Balance Company, of Denver, Colo., offers something new, its style C pulp balance, sensitive to 1 mg., and having a capacity of 200 g., to go in a leather-covered carrying case 7½ by 12 by 13 in., with one of the firm's portable button-balances. The two balances complete weigh less than 15 lbs. The company's style R portable balance, sensitive to 1-200 mg., is listed at $165, and the company's style S balance, sensitive to 1-50 mg., is listed at $85.

Special Circulars Nos. 36 and 37, sent by the Chicago Pneumatic Tool Company, of Chicago, Ill., to any one desiring them, illustrate and describe a representative line of the company's pneumatic appliances. Circular No. 36 treats of Boyer long-stroke hammers and Chicago riveters, and gives directions for the care of hammers, and some interesting comparisons of the cost of hand and pneumatic power in structural or boiler work. Circular No. 37 describes the Little Giant and Boyer piston air-drills, wood-boring machines, flue-cutters, etc.

The Combination Rubber and Belting Company, of Bloomfield, N. J., issues a neat little pamphlet of 84 pages. The company states that it has had over 30 years' experience in the manufacture of vulcanized rubber for mechanical purposes, and claims to have the largest factory of the kind in the world. The

company says that its Indestructene rubber belting is vulcanized thoroughly and evenly, the stretch entirely taken out and the surface made perfectly smooth. An 8-in. 7-ply belt of this brand stood a tensile strain of 9,500 lbs. before breaking. The pamphlet contains notes on the use and misuse of rubber belting, splicing belts, etc. The company makes reinforced-cover conveyor belts, concentrator flange belts, oil well belts, and belts for mills, brick yards and all varieties of service; also belt hooks, lace leather, ore buckets, etc. The hose listed in the catalogue includes engine and hydrant hose, steam hose, air drill hose, gas hose, hydraulic hose, acid hose, suction hose, etc. The company also makes sheet packing, hydraulic packing rings, piston packing, pump valves, gaskets, etc., in a variety of grades and styles, as well as rubber springs and rubber cement.

## SPECIAL CORRESPONDENCE

**Denver.** May 9.

*(From Our Special Correspondent.)*

In consequence of an appeal to President Roosevelt instructions have been issued from the office of the United States Solicitor General in Washington to the United States District Attorney at Denver, to push the criminal and civil suits arising out of the Hull City placer patent at Cripple Creek, and the many scandals connected therewith. The suits have been dormant for three years, and it seems probable that new special prosecutors will be appointed.

In the Federal Court at Denver on May 7, in the suit brought by the present owners of the Stratton Independence Mine, Cripple Creek, against the estate of the late W. S. Stratton, to recover $4,000,000, Judge Caldwell denied two motions made by the defendant's attorneys, which decisions, however, do not affect the merits of the case.

The better prices for lead, silver and zinciferous ores are giving a considerable impetus to many mining districts. Though the State has not developed any phenomenal mining district since Cripple Creek the opening of new properties, the rehabilitation of old ones and important strikes in the existing mining districts augur well for the future of the industry.

Within the last few weeks several quite important strikes have been made in various properties in the San Juan country, the most notable being in the Esmeralda, near Howardsville, and in the Big Colorado, near Gladstone, where a cross-cut tunnel, at 1,600 ft. from the portal and at a vertical depth of 700 ft., cut an expected vein of great width, showing high values.

The natural result is that the mining industry is attracting considerable new capital, much of it legitimate use, but also irresponsible promoters, knowing little of mine management. One promoting concern in New York City is now floating its third Colorado Company by means of specious literature and advertisements. Even had such new properties the intrinsic merit claimed, the character of the promoters and controllers of the companies practically insures irresponsible management and inevitable loss to the shareholders. Another set of promoters from the East several years ago secured a really meritorious property. With experienced and competent management, $50,000 should have placed such property on a permanent basis, but the promoters have frittered away $100,000, whether on the property or not cannot be ascertained, the company's treasury is empty and the property shut down. No meeting of shareholders has ever been called since the company was organized several years ago, nor has any financial statement ever been issued to the shareholders, and all attempts by shareholders to ascertain facts have been evaded, yet the same men have secured property in another part of Colorado, and are again trying to get money from Eastern people.

**San Francisco.** May 6.

*(From Our Special Correspondent.)*

Matters in connection with miners' strikes in both Amador and Shasta counties, have quieted down. In the latter county there is still some little inconvenience, but in Amador County the whole trouble seems to have been settled on the basis mentioned last week.

An illustration of the foolish methods used in trying to advertise gold mining in certain counties is furnished by papers in Monterey County, one of the counties in the coast range. The papers state that Los Burros District has averaged an output of coarse gold of about $100,000 annually for the past 15 years. The facts are that some 12 years since one mine struck a little vein of rich ore and took out many thousand dollars' worth, quitting work at the end of the first year, because it ran out of the pay streak. Other companies have made spasmodic attempts at mining from time to time, but from 1896 to 1900 no output at all was made. In 1901 about $14,000 was taken out by the miners at Los Burros, but no big strikes have been made since the days of the old Cruikshank Company. Instead of over $1,500,000 having been taken from these mines in 15 years, not even $150,000 were taken out in that time.

**San Luis Potosi, Mex.** May 6.

*(From Our Special Correspondent.)*

The Mexican revenues have in the last six years increased over $14,500,000, and throughout the Republic there is scarcely a section where small change is not at a premium. It is learned that 500 Chinese laborers are due at Mazatlan, about May 15, on the *Athol*, of the Chinese Commercial Steamship Company.

The Mexican Investment and Development Company, of Philadelphia, Pa., is looking for investments, and has at present among its holdings the famous old Agua Blanca mines, near Ayutla, in the State of Jalisco, where are the ruins of an old copper smelter and rolling mill, built by some Americans over 50 years ago. The ore runs about 4 or 5 per cent copper, mostly as chalcopyrite and bornite. The new company has the machinery on the ground for a 50-ton concentrating mill, and as soon as it can be erected work will be resumed on the old property. The Camotlan property (near Manzanillo in Tepic) is owned by the Pan-American Exploration Company, of St. Louis, Mo., which has done much exploratory work with unsatisfactory results, operations being directed by a southeast Missouri lawyer. The Cacoma mines and smelter have closed down by reason of poor management. Of the $25,000 expended, it is understood that only some $6,000 were spent in the mines. But neither of these is as bad as the scheme worked up on the strength of a little find in the Santo Domingo Mine, near Etzatlan, Jalisco. This property has recently been sold, including mill, ranch and stock, for $320,000, Mexican currency, of which $100,000 has been paid down. How the owners ever got this price is a mystery to all who know anything of the property, which has been unfavorably reported upon by at least half a dozen able engineers. Heavily mortgaged, the property has made an appearance as a mine, for a number of years, by allowing "buscones" (small leasers) to rob the pillars, until the mine is in such condition that it would require a fortune to put it in proper shape, and another to find the ore. However, the Amparo Mining Company, of Philadelphia, Pa., formed, capitalized at $3,000,000, is now selling stock on the strength of the pocket of rich ore mentioned. The Cusco property, also near Etzatlan, is a like proposition of the same people. At Ameca, in Jalisco, the San Vicente Mining Company, has started a new lixiviation plant and concentrating mill, with a smelter in contemplation.

In Lower California the Boleo Copper Company, near Santa Rosalia, almost opposite the port of Guaymas, Sonora, is owned and operated by the Rothschilds, of Paris, France, who have expended about $10,000,000 gold in the enterprise. The camp has a population of some 3,000, and the smelters produce about 300 tons per day of 40 per cent copper matte. And about 200 miles south from the American border, at Santo Domingo, some San Francisco men are engaged in placer washing. Of the greatest importance to Lower California is the grant to E. H. Harriman, of a land and cash concession, to build a railroad from a point on the Southern Pacific to San Jose del Cabo, the extreme southern point of the peninsula, passing through Tijuana, Eusenada, Escoba, Santa Julia, Santa Rosalia, La Paz, Virgin, Todos, Santos and Triunfo.

Exchange on New York went from 222 last Monday to 242 on Thursday, and back again Saturday to 228. The feeling of uncertainty as to silver has prevented much business in exchange, and the feeling is that the tendency is for a lower rate. Mining stocks continue rather inactive. The few that changed were: Monterey Iron and Steel, $100; Dos Estrellas, $215; Cinco Senores, $215; La Paz, Matehuala, $725; Candaleria de Pinos, $315; Esperanza, $1,180; Carmen, of Pachuca, $135; Sorpresa, Pachuca, $305; San Rafael y Anexas, Pachuca, $380; Luez de Borda, $55, and Amistad y Concordia, $73.

**London.** April 29.

*(From Our Special Correspondent.)*

In my last week's letter I dealt at some length with the case of the Great Fingall Consolidated, and mentioned that several points in connection with the policy of the company were under discussion by the directors and shareholders of the company. The general meeting was held this week, and the various propositions were entered into very fully. In the first place, the propriety of Mr. Moreing being chairman of the company, in addition to his firm having the management and the preponderating influence on the board of directors, was challenged by fully half the shareholders, and it was decided to fill the vacant directorship by the election of an independent shareholder. Mr. Moreing also intimated his desire to vacate the chairmanship, but at present no other director will accept the post, so Mr. Moreing continues. There was a good deal of opposition to Mr. Moreing and his business friends on the part of various shareholders, who ungraciously looked the gift horse in the mouth when Mr. Moreing stated that he had made good the defalcations of his late partner, the secretary of the company, to the extent of £32,000. They even opposed the re-election of the auditors, because they acted in this capacity, and had done so for a long time, for all Mr. Moreing's companies. This action might easily be attributed to a disbelief in the integrity and honor of an eminent firm of chartered accountants, and was not indorsed by the meeting. Apart from these personal matters, an important point in company administration was decided when the proposal to increase the capital was discussed. Your readers will remember that the company required £150,000 additional capital, partly to extinguish loans against gold in transit, and partly to increase the equipment of the mine. The board of directors had proposed in the circular convening the meeting to issue new shares, because they thought such a method of raising the money would be most acceptable to shareholders. At the meeting, however, Mr. Moreing made a notable appeal against this method of finance, and quoted the general principle that whenever possible the costs of development and equipment should be paid out of income. In this case the company has £100,000 balance of profit from last year, and at present is earning a profit of £30,000 a month. The money required is, therefore, already in hand, with 10 months' profits for 1903 untouched. The dividend for 1902 was £175,000 on a capital of £125,000, and there is sufficient ore in sight to make a profit of £300,000 a year for some time to come. The question whether the £150,000 should be charged to revenue or capital appears unimportant in this case, but a great mine owes a duty to the public in upholding the general principle quoted by Mr. Moreing. After due discussion it was almost unanimously decided to adopt Mr. Moreing's view, and to withdraw the proposition to create new shares. In looking through records of other companies, I find that in the case of the Mysore group of mines most of the additional capital required for extending the plant of prosperous mines has been raised by issuing new shares by the unanimous desire of both directors and shareholders. On the other hand, Mr. R. T. Bayliss, in dealing with El Oro and other companies under the control of the Exploration Company, advocates the payment of expenditures for extensions out of income. The whole question deserves discussion in greater detail than is possible within the limits of this letter.

The report of the Libiola Copper Mining Company for 1902 shows a divisible profit of £8,200, which permits only a 2½ per cent dividend. This mine has been a very regular producer since 1867, and has paid dividends varying from 4 to 8 per cent on a capital of £252,000. The mine is situated in Italy, near the port of Sestri Levante, and is directed by leading London copper merchants. The output of ore during 1902 was 4,564 tons, averaging 4.75 per cent copper and 22,727 tons of barren pyrites, averaging 47.5 per cent sulphur. The mine contains large reserves of low-grade ore, which are now being worked, and its life may be prolonged indefinitely.

Another old stager that has just issued its report is the Linares Lead Mining Company, which has operated the mine of that name in Spain since 1852, and is under the direction of Messrs. John Taylor & Sons. For many years the profits were very regular. The total nominal capital is only £45,000, and shareholders have received nearly £500,000 in dividends. During the past two years the ore has decreased in value, and this, together with the low price of lead, has prevented operations being conducted at a profit. A few months ago Mr. William Frecheville and Mr. Henry Taylor thoroughly examined the property and made a number of suggestions for development and exploration work. Mr. Frecheville considers that, with a greater output and modern machinery, profits may be made on the ore now in sight. It is to be hoped also that exploration will expose new ore-bodies, as it would be a pity if this sound old mine should go out of existence.

**Sydney, N. S. W.** March 30.

SOUTH AUSTRALIA.

*(From Our Special Correspondent.)*

Reports from Centralia still continue to be conflicting, causing shares to fluctuate. The Government geologist's report is anxiously awaited.

The Mining Registrar at Mount Magnet reports a new find of alluvial gold 6 miles west from the Government well. Eighty men are on the field and all are doing well.

TASMANIA.

*(From Our Special Correspondent.)*

The Mount Bischoff Tunnel Mines Company has declared its 312th dividend of 7s. 6d. per share, which disposes of £4,500. The total sum paid in dividends to date by this mine amounts to £1,851,500 ($8,999,775), or £156 10s. per share.

During February the Briseis tin mine removed 26,950 cu. yds. of overburden, and won 23.25 tons of tin oxide.

The directors of the Tasmanian Gold Mine have decided to install a powerful pumping plant capable of delivering 8,000,000 gal. per day.

The Mount Lyell smelting returns from February 5 to March 4 were 21,577 tons of ore, the average assay before treatment being copper, 2.22 per cent; silver, 2.22 oz., and gold, 0.071 oz., in addition to which the works treated 3,470 tons of purchased ore and metalliferous fluxes.

## GENERAL MINING NEWS.

*Mineral Oil Exports.*—In April the United States exported 5,963,069 gals. crude oil, 1,350,309 gals. naphthas, 60,483,240 gals. illuminating, 8,972,738 gals. lubricating and paraffin, and 654,738 gals. residuum; total, 77,424,094 gals., against 87,833,201 gals. in the same month last year; showing a decrease of 10,408,107 gals. For the four months ending April 30 the exports were 266,566,384 gals., as against 334,318,613 gals. in the corresponding period last year; a decrease of 67,752,229 gals., or about 20 per cent, principally in crude and illuminating oil.

### ALASKA.

COPPER RIVER DISTRICT.

*Nicolai.*—An important lawsuit over this and other properties has been instituted by the Chittna Exploration Company against R. F. McLelland, representing New Yorkers, including the Havemeyers. The Chittna Company alleges that after purchasing the Nicolai Mine it engaged McLelland as an expert to locate other properties, and that he took title in his own name and sold the properties to the Havemeyers. The trial is to be before Judge Wickersham at Valdez.

*(From Our Special Correspondent.)*

It is reported from Tacoma that the 105 copper claims owned by Robert Biel and associates in the Copper River region have been sold to George Mitchell, of Cornwall. The price named runs up to so many millions that it discredits the whole transaction, as the properties are undeveloped and, of course, as yet unproductive.

### ARIZONA.

COCHISE COUNTY.

*Ivanhoe.*—This group of 12 claims, comprising 220 acres in the Warren mining district, has been taken over by the recently incorporated Quincy & Arizona Mining Company, composed of Michigan people. The company is capitalized at $6,000,000, divided into 60,000 shares. Capt. James Wilcox, superintendent of the Mass Mine at Mass, Mich., is president; Joseph Croze, of Houghton, Mich., vice-president, and E. L. Wright, of Hancock, Mich., secretary and treasurer.

*Tombstone Consolidated Mines Company.*—Sinking the main shaft continues regularly, the intention of the company being to reach the 1,000-ft. level before cross-cutting. The pumps now throw an average of 2,000,000 gals. daily. A considerably increased flow has recently been encountered. If the pumps are stopped for a time the water rises 9 ft. in six minutes. The shaft is now 720 ft. deep, but will be sunk some 15 ft. further before the 7th level station is cut. The fuel and supplies are now delivered at the mine by rail. Preparations are making to reopen the Emerald and the Lucky Cuss properties.

PIMA COUNTY.

*(From Our Special Correspondent.)*

*Old Boat.*—This copper mine, in the Silver Bell District, some 65 miles west of Tucson, are reported sold to a syndicate formed of E. B. Gage, of Tombstone; ex-Governor N. O. Murphy, and the Development Company of America, which was represented here by George A. Beaton. Investigations have been progressing for several months, and the parties named have visited the property, which, according to report, has been acquired of Alfred Steinfeldt, of Teckendorf & Co. for $700,000. The nearest shipping point by rail is at Red Rock Station, on the Southern Pacific Railway.

SANTA CRUZ COUNTY.

*(From Our Special Correspondent.)*

*Sorrel Top.*—This group of gold mines in the Oro Blanco District is reported sold to New York men under the corporate name of the Sorrel Top Mining and Milling Company.

*Tres Amigos.*—The negotiations which have been under way for some months, are said to have resulted in the transfer of this property to a New York Company, known as the Sienita Mining and Milling Company.

YAVAPAI COUNTY.

*Crowned King Gold Mining Company.*—This corporation has its principal office at Edinburg, Ill., and has been in litigation for a number of years, principally over a bill for an accounting, and the appointment of a receiver filed by Orrin F. Place, the principal minority stockholder. The company leased the right to work the tailing dump, estimated to contain 40,000 to 50,000 tons, to J. L. McLean & Co., of New York, at a royalty of $2 per ton in February, 1903, on April 15 the original plaintiffs filed in the Circuit Court an additional petition for the appointment of a receiver and the annullment of the lease, alleging that the lease tied up the property indefinitely, and was in pursuance of a conspiracy to freeze out the minority stockholders, etc. This application for a receiver was refused, but the lease to McLean was canceled and set aside. A further petition for an injunction was then filed by the plaintiffs, which will be heard on May 22.

*(From Our Special Correspondent.)*

*Congress.*—The 3,500-ft. level is being opened. There is no inflow of water, and the mine is dry.

*Seven Stars Gold Mining Company.*—Justice Brown, in the United States Supreme Court, recently rendered a decision in the case of Clinton B. Wiser and others versus John Lawler and Edward W. Wells. The case had been appealed from the Supreme Court of the Territory of Arizona, and involved the operations of this company, which was organized by H. H. Warner, of Rochester, N. Y. Lawler and Wells, the original owners of the mine, bargained to sell it for $450,000 to the Seven Stars Company. The deed was placed in escrow, with the understanding that the purchase money should be delivered to the company. The property was advertised extensively both in the United States and in Great Britain. The stockholders endeavored to hold Lawler and Wells responsible for misrepresentations in the prospectus, and to estop payment of the purchase money to them. The court held, however, that defendants had not been cognizant of the representations of the mining company and that even if they had been informed on the subject they could not have been held responsible. The opinion affirmed the decision of the Arizona Supreme Court.

### CALIFORNIA.

CALAVERAS COUNTY.

*Casinelli.*—Work will start soon at this mine at Central Hill, recently bonded to Thomas Flint, of Hollister.

*Del Monte.*—Good progress is being made with development at this mine, near Railroad Flat.

*Star of the West.*—A strike of very rich free gold ore is reported in this mine at Rich Gulch, 6 miles from Mokelumne Hill.

EL DORADO COUNTY.

*Havilah.*—This mine, near Nashville, which has been closed for 10 years, is to be reopened under the management of Mr. Allen. The Joshua Hendy Machine Works, of San Francisco, has owned the property for some time. The shaft is down 800 ft., and there is a 20-stamp mill.

*Monte Milling and Mining Company.*—This company, of Sacramento, is actively developing its Del Monte Mine on the American River, near Coloma. A site is being graded for a 5-stamp mill, and a ditch for power has been started.

*Revenge.*—Good ore has been struck by William Dixon in this old mine at Greenwood, and there is talk of putting in a small mill.

*Zantgraf.*—This old mine, which was at one time a large producer, is being reopened. The plant destroyed by fire some time since is being rebuilt, and will be in operation this summer under Superintendent A. B. Eastwood, of Loomis.

KERN COUNTY.

*Angelus.*—It is reported that this mine, 15 miles from Johannesburg, has been sold by its Los Angeles owners to Colorado men. The mine is in a gravel deposit in an old river bed.

*Baltic.*—This mine, with its 10-stamp mill, near Randsburg, is doing well. It is owned by W. H. Wynn, who acts as superintendent.

MARIPOSA COUNTY.

*Austin.*—At this group, near Whitlock, S. N. Trowbridge manager, good pay is cut in the Ragan super- New buildings are being put up.

MONTEREY COUNTY.

*Monterey Mining Company.*—This company, at Los Burros, is driving a 600-ft. tunnel under supervision of Mr. Plaskett, to tap the main ledge by running through Cruikshank Hill.

NEVADA COUNTY.

*Standard.*—Buildings are being put up and machinery placed at this mine, near Grass Valley. The water will soon be pumped from the shaft.

*Sunflowr.*—This mine, near Grass Valley, owned by Dr. Look and others, of Sacramento, is expected to start up again shortly.

*Union Hill.*—Active operations will soon be resumed on this mine, near Grass Valley, E. C. Creller superintendent. The mine was closed not long since, owing to the influx of surface water.

PLACER COUNTY.

*Pine Hill.*—At this mine, 14 miles from Auburn, the 10-stamp mill has been running since January 1, and 25 men are at work. Mr. Rosenthal is superintendent.

RIVERSIDE COUNTY.

*Chuckawala.*—The owner, the Red Cloud Mining Company, of Los Angeles, intends doubling the capacity of the plant. Nine miles of pipe are to be put in.

SAN BERNARDINO COUNTY.

Sixty-three mining claims in Bagdad District, near Ludlow, have been sold to Senator S. W. Dorsey and his associates. Most of the claims are as yet undeveloped.

SAN DIEGO COUNTY.

*Helvetia.*—Work has been resumed on this mine, near Julian, with a small force of men.

*Old Padre.*—Another search for this mine has been instituted by Los Angeles and Ventura County men under the guidance of Guadalupe Elwell, of entura. one of the numerous "lost mines" of California.

*Owens.*—This mine, at Julian, will soon be transferred to John A. Rowan, of Helena, Mont.

SIERRA COUNTY.

*Keystone.*—At this mine, near Sierra City, S. Cheyney manager, miners have cut a rich pay shoot in the lower tunnel. The mine was closed many years until lately. The tunnel is in 3,000 ft., and the vein is 6 ft. wide. M. H. Mead was long the principal owner and is now interested in the company operating the property. A mill will shortly be erected.

SISKIYOU COUNTY.

The owners of 17 claims in Elliott Creek District, have sold their properties to J. F. Reddy, of Spokane, Wash., for $220,000, first payment of $45,000 to be made by December 2, 1903, and final payment by August 2, 1904. These are gold and copper claims known as the Blue Ledge and Sams Ledge group, at the head of Beaver Creek. The new owner is to put 50 men at work.

*Ager.*—This coal mine, owned by the Siskiyou Mining and Development Company, has its incline down 825 ft. There is said to be an improvement in quality with depth.

*Blue Gravel.*—Ten men are doing preliminary work in opening this mine, near Yreka, under the superintendence of John Garvey.

*Condrey.*—The parties holding the bond are thoroughly prospecting this claim not far from Yreka.

*King Solomon.*—From this mine, near Cecilville, J. A. Thompson manager, fine ore is taken with 50 men employed.

*Las Perlas.*—At this mine, near Cecilville, J. L. Rankin superintendent, high-grade ore is being mined.

SONOMA COUNTY.

*Ada.*—Action to quiet title to this and the Big Blue mining claims at Glen Ellen has been brought in the County Superior Court.

*Jud-Cramer Mining Company.*—This company has been organized in Santa Rosa to work the Jud Cramer gold mine, near Glen Ellen. P. H. Atkinson is secretary.

TUOLUMNE COUNTY.

*Blue Eagle.*—This mine, in the Jawbone District, has been bonded by A. A. Carter.

*Densmore.*—At this mine, near Columbia, the mill and cyanide plant are running. The shaft is 150 ft. below the adit level.

*Jumper Gold Syndicate.*—This company, of Stent, Mark B. Kerr manager, will add 40 stamps to the 60 now running.

*Neale.*—A pocket in this old mine, at Sonora, recently yielded over $5,000 to the lessees, Charles Smith, Robert Herald and Robert Watson.

*Newcomer.*—J. F. Newcomer has sold to R. C. Davis a half interest in this mine. A 2-stamp mill is included.

*Porto Fino.*—This mine at Carters, which has been idle some time, will soon start up.

*Santa Ysabel.*—A steam-hoisting plant fit for 2,000 ft. deep is proposed for this mine at Stent.

*Swerer Brothers.*—This quartz mine, mill, etc., at Tuttletown, is now owned solely by William A. Swerer.

*Vine Spring Hill.*—This mine, near Columbia, has been sold by James McCormick to the Yankee Hill Mining Company for $5,000 cash. The company has had the mine under bond some time.

YUBA COUNTY.

*Beeney.*—Two Keystone drills for prospecting have been taken to this farm, 6 miles from Marysville, on the south side of the Yuba River. The land has been bonded for dredging.

*Fortuna Mining Company.*—This company has secured 420 acres of placer mining ground, near Bullards Bar, there being 21 claims in the original locations. Borings and drifting thus far have been satisfactory to those interested, and more systematic work is to be done.

### COLORADO.

CLEAR CREEK COUNTY.

*Gladstone and Big Medicine.*—These properties were purchased recently by the Arizona Mining and Development Company. They intend beginning operations at once. F. A. Babcock, former owner, is superintendent.

*St. Paul Company.*—This company, it is said, has purchased from Sid Williamson the Gray Copper, Esmay and Strousse lodes.

*Sun & Moon.*—The annual election of officers for this company was held recently. W. J. White, New York, was elected president; C. A. Wimpsheimer, New York, vice-president; Nathan Westheimer, New York, secretary and treasurer; Martin Nathan, assistant secretary; John U. May, Cleveland; C. S. Britton,

Cleveland; G. G. Sodan, Cleveland; Joseph Manheimer, New York, and F. C. Goldsmith, New York, constitute the directorate. The labor troubles between the employees of this company and the management are reported not yet settled.

*Transcontinental Transportation and Mining Company.*—This company was incorporated recently for the development of property in and around Georgetown. The company intends to drive a tunnel about 7,000 ft, long under Argentine Pass, at an elevation of about 11,000 ft. At present the tunnel is in 300 ft. The capital is $3,000,000. The directors are Rees C. Vidler, of Georgetown; R. Hanford Blackman, of Clear Creek, and W. A. L. Cooper, W. J. Scase and L. F. Kimball, of Denver.

FREMONT COUNTY.

*Rocky Mountain Fuel Company.*—This company, of Florence, has bought what is known as the Teller tract of 760 acres of coal, oil and agricultural land near Florence. The grantees are Henry M. and Willard Teller, and the price was $145,000. The land has been quite thoroughly developed, and the company has been operating coal mines upon it, under lease for several years. The coal is of the grade known as Canon City.

*United States Reduction and Refining Company.*—Eight car-loads of structural steel have been received by this company for rebuilding that part of the plant recently destroyed by fire. All of this will be used in the construction of vat houses. The machine shops are completed, except placing the machinery, and the foundations for the refinery have been laid. All the new buildings are on a much larger scale than that of those destroyed, and have many conveniences for handling the product. The sampler, which was in course of construction at the time of the fire, will be in operation within six weeks. It is a separate building, but is connected with the smelter and smelter yards by elevated tramways.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

*Boston & Denver Consolidated Mines and Milling Company.*—The company's property was sold May 8 under foreclosure. The property comprises about 50 lode claims, among which are the Gregory, Bobtail, Fisk, Cook and others, a number of mill sites, the new 80-stamp mill, a large amount of land, and all machinery and improvements thereon in the Gregory District, near Black Hawk. The property was offered in two lots or parcels, the first parcel being bid in by E. W. Hurlbut, of Denver, in behalf of Western creditors, and the second in the name of Dudley Porter, of Haverhill, Mass., and Theopilus King, of Quincy, Mass., representing Eastern creditors, the three acting as trustees. The bids offered were $71,000 and $200,000, which were accepted, as there were no other bids. The failure of the properties to give returns to the stockholders, although a large amount of money has been spent during the past four or five years in top plants and the new mill, is said to be due to bad management. Until the sale is confirmed by Judge Carpenter the receiver will remain, but it is believed that the sale will be confirmed, and a new manager appointed. The owners, it is understood, will sink the Cook shaft 300 ft. more to the same depth as the Fisk, and will make it the main operating shaft. The properties are credited with a production of over $20,000,000, principally in gold, and experienced mining men believe that with the proper management the properties will regain their prestige.

*Colorado-Tellurium Gold Mining Company.*—This company is retimbering the main shaft of the Freedom Mine from top to bottom, 825 ft., and as soon as this work is completed sinking will begin to the 1,200-ft. point. In opening the levels, good ore has been cut in the 510 east level, and the winze below the 625-ft. level shows nice ore. Paterson, N. J., parties are operating under a lease and bond. Richard Borcherdt, Central City, is in charge.

*Helen Gold Mining and Tunnel Company.*—A good strike is reported from the 300-ft. tunnel in the Pine Creek District. Assays from the strike show values up to $160 per ton, chiefly in gold. The property is within 2 miles of the new Moffat road. Denver and Eastern men are interested, with J. C. Heinz, Arapahoe Building, Denver, as secretary and treasurer.

*Old Kentucky.*—It is reported that this property is to be worked again, and that $100,000 has been set aside for developments and new machinery. The shaft is down 700 ft., and a new hoisting and boiler will be required for deeper work. Samuel Lesem, of Denver, Colo., is president of the company, the property is in the Hawkeye District, about 6 miles west of Black Hawk.

*Pleasant View.*—New York and Denver men are the owners, and they are preparing for active developments by installing a steam hoist plant. The property has produced some very high grade ores, and will be in charge of Ed. Reser, Central City.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

The rise in silver has helped small lessees. The iron tonnage continues to hold firm, while shipments of manganese and zinc during the week have increased.

*Leadville Manganese Production.*—The output is 175 tons a day, all shipped to the Pueblo steel works. The ruling price is $3 a ton, and production is likelyl to increase.

*Ball Mountain Company.*—When legal difficulties are straightened out, good ore in sight will be shipped.

*Boulder Mining Company.*—Arrangements are under way for securing machinery to drain the White Cloud shaft.

*Carey.*—New lessees have started work on this claim, owned by the Small Hopes Mining Company. Shipments will be made from a fair grade iron body at once.

*Chrysolite.*—The shaft was not damaged by the fire on the ground this week.

*Crown Point.*—New lessees are opening an oxidized iron body at the 500-ft. level, and shipping about 50 tons daily.

*Fryer Hill Mines Company.*—The annual meeting will be held on May 19.

*Gold Basin.*—Diamond drill work has ceased, and the rich but small vein is being followed in a new drift.

*Hayden Lima Mining Company.*—Lima, O., men are back of this large placer enterprise southeast of the city. A double flume is to be finished and work will start about May 20. The company spent some $15,000 in preparatory work last season.

*Louisville Combination.*—Mining work at present is at the 600 to 700-ft. levels, where are large bodies of zinciferous material, which extend below the water level.

*New Leadville Home Mining Company.*—Reports read at the directors' meeting this week show satisfactory conditions at the mine, while shipments of good-grade iron average 250 tons daily.

*Valentine Mining Company.*—Diamond drill work has ceased and is being followed.

*Yak Mining, Milling and Tunnel Company.*—Much prospecting and development is being done along the line of the tunnel in the silver-lead belt. Recent developments show that the great copper sulphide shoot of the Moyer extends as far west as the Minnie Lee.

*Iron-Silver.*—Connections are being made with the new workings from the Moyer ground. This mine now has an immense deposit of zinc material opened. Shipments continue at 300 tons daily.

OURAY COUNTY.

*Camp Bird, Limited.*—The report for March shows 5,913 tons of ore crushed. Bullion sales amounted to $142,924, concentrates sales (407 tons) to $23,386 and 3,250 tons of material treated at the cyanide mill are estimated to have yielded $8,775, making the total income $175,085. The working expenses are given as $58,530, leaving a profit of $116,555, from which should be deducted about $3,500 for expenses in London.

*Mickey Breen.*—A strike is reported in this mine in Poughkeepsie Gulch, near Ouray. F. M. Jackson is superintendent.

*Paymaster.*—This mine in Poughkeepsie Gulch, which was acquired by a strong company late last season, headed by R. O. Hobson, of Ouray; J. H. McCorkie, of Pueblo, and B. F. Paperlik, of Chicago, will enter the list of shippers soons.

PITKIN COUNTY.

*Argentum-Juniata Mining Company.*—The property of this company, consists of 50 acres patented claims near Aspen. It is to be foreclosed to satisfy an indebtedness approximating $55,000 held by various stockholders. Some months ago a call was made for subscriptions to pay off the outstanding indebtedness, and those of the shareholders who contributed hold notes from the company. Upon foreclosure, the company will be reorganized and the stock distributed pro rata among those who so subscribed. The Colorado Title and Trust Company, of Colorado Springs, will act as trustee for the stockholders. J. A. Hayes, of Colorado Springs, is president of the company; C. E. Palmer, vice-president and general manager, and Irving Bonbright, secretary and treasurer. The Argentum-Juniata owns a mill jointly with the Mollie Gibson, adjoining, and a year ago had more than $16,000 cash in the treasury. There are several miles of tunneling, drifts and levels in the property. During the quarter ending January 1, 1902, alone, the Argentum-Juniata Mine produced $92,621, with a net profit of $47,881. Dividends to date, according to a Colorado paper, aggregate $156,000.

SAN JUAN COUNTY.

*Duprez Mining Company.*—This Silverton company has bonded the Inez-Hollister group, in Burrows Park, for a reported sum of $80,000.

*Gold Tunnel and Railway Company.*—This company is reported having made a rich strike in its Highland Mary Mine, at the head of Cunningham Gulch. The vein is said to be about 2 ft. wide, and of nearly solid gray copper, carrying from 500 to 1,000 oz. silver per ton. The mill on the property is about ready to start.

*Silverton Mining Company.*—This company, of Silverton, is unwatering the large shaft on its North Star Mine on Sultan Mountain. The company owns about, 450 acres of mining property, and a well-equipped mill on Mineral Creek. The North Star property was a heavy producer in former years, and gave employment to 200 men. The present company is reported having expended $130,000 in development and improvements during the past two years.

(*From Our Special Correspondent.*)

*Copper King.*—Arrangements are being made to put on a large force as soon as the snow melts. A small force has been employed during the winter and several car-loads of high-grade ore await shipment.

*Natalie-Occidental.*—The Magnolia vein has been cut and measures 14 ft. between walls, with an average value of $9.60 per ton in gold, silver, copper and lead. A mill is to be built at once, Manager Hurley, of Silverton, having secured plans from Denver firms.

*New York-Brooklyn.*—Negotiations for the sale of this Silverton property by Manion Brothers & Murphy to E. Newhouse, of Salt Lake City, are declared off, and the owners have resumed work and shipments. The Johnson Mill has been secured under lease for treating the low-grade ore, and the high grade is being stored until the railroad is open.

*Venetian Mining Company.*—This company, composed of Chicago men, has bought the Fisher mill and mill site and the Evelyn group of claims from the Evelyn Mining Company, of Denver, the price paid being $15,000. The Peacock property on Peacock Mountain is also to be worked through the Evelyn Tunnel.

SAGUACHE COUNTY.

*Independent.*—At a conference between Manager McGeorge and the miners' committee, the strike at this mine at Crestone was amicably settled. All the old men who applied for work were taken back on an 8-hour day at the old wage scale. The strike, which lasted about three weeks, was caused through the company requiring its engineers to work 12 hours.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

*Free Coinage.*—The properties of this company are worked under lease, the main workings being operated by Harry Shell and associates, who have a small force at work. The property belongs chiefly to the estate of the late Sam Strong.

*Geological Survey of Cripple Creek.*—All the money has been raised for this geological survey. The survey is to cost about $7,000, one-half to be paid by the Government and the other half furnished by the district. It is understood that work will begin about July 1. The money furnished by the district was given mostly by the mining companies, the cities of Victor and Cripple Creek, Teller County, the brokers and railroads. It is understood that Mr. Waldemar Lindgren will have charge of the survey.

*Hawkeye.*—Work is progressing on this claim, near the Lincoln, and near the town of Gillett. It has been equipped with a steam hoist, and the shaft is about 75 ft. deep. Good values are reported.

*Last Dollar.*—A strike of sulphide ore is reported in the 1,250-ft. level. It is said to be one of the richest strikes ever made in the district, but sufficient work has not been done to determine what it will amount to. Charles Walden is in charge.

*Old Gold.*—Some very good ore has been discovered in this property on Beacon Hill, thought by some to be the C. K. & N. vein. The property adjoins the Raaler claim of the C. K. & N., and is worked under lease. The shaft is over 200 ft.

*Shurtloff No. 2.*—Steady shipments are being made from this property on Bull Hill, just south of the Burns claim of the Acacia Company. It is operated by the Valley City Gold Mining Company, under a lease and bond. The shaft has been sunk to a considerable depth, and a large amount of ore shipped. There is litigation among the owners as to the ownership of an interest in the property.

*Stratton's Cripple Creek Mining and Development Company.*—Nothing has been determined as to when the leases are to be granted. It is rumored that the property is to be sold to Eastern men, but nothing definite can be learned. Some work is being done by the company. N. G. Rice has charge.

*Stratton's Independence, Limited.*—The report of a strike of rich ore on the lower levels has been denied.

## IDAHO.

ADA COUNTY.

*Fairview Mining Company.*—This Pittsburg, Pa., Company has made the third payment of $7,500 on the Fairview Mine, located west of Monumental Creek.

IDAHO COUNTY.

*Belle of Thunder Mountain Company.*—This company will install a 40-stamp mill on its Sunnyside Mine, near Roosevelt, during the summer.

*Dewey.*—It is now said that 50 of the 100 stamps purchased for this property will be installed as soon

as the condition of the roads permit hauling from Emmett.

*Jumbo.*—Frank Brown, manager of this mine in Buffalo Hump, states that the new mill will be ready for work about July 1. The mill will then have 14 stamps, although the mill building is being constructed for 30 stamps. The power will be generated on Lake Creek.

*Kansas City Gold Reef Company.*—This company intends installing a 20-stamp mill on its property during the season.

*Keep Cool.*—This property, on Siegel Creek, near the American Eagle Mine, near Elk City, was sold recently to a local syndicate for $10,000 cash, composed of Dr. F. O. Hudnutt, N. S. Gervais, J. S. Buchholz, John Morris, John Brown, Fred R. Lovell and C. C. Mitchell, of Elk City, and W. G. Green, of Duluth.

SHOSHONE COUNTY.

*Ella & Missing Link.*—The decision of the Federal Court in the action taken by Patrick Clark et al. against the Buffalo Hump Mining Company and the Empire-State Idaho Mining and Development Company to procure a cancelation of the deed conveying a four-fifths interest in these claims, near Burke, reconveyance has been affimed by the Circuit Court of Appeals. Clark claimed fraud.

*Fidelity Company.*—This company is working 14 men at its property on French Creek, near Pierce, and is running two pipes night and day.

*Highland Chief.*—The first payment of $7,500 on the purchase price of this property, located on Pine Creek, has been made by the St. Paul people, who bonded it for $150,000. The company, with Mr. Goodrich as manager, is erecting a sawmill, and intends installing an air compressor, and later a concentrator on its property.

*Musselshell.*—L. C. Roberts, manager of this property, left Pierce recently for the claims to start work.

*New Jersey Gold Mining Company.*—This company, whose property is located near Wardner, recently gave a contract to a Portland firm for a 10-stamp mill, electric lighting plant and steel for a tramway, the machinery to be delivered within 30 days. The company is completing a large flume to furnish water power for the mill.

*Rich Hill Company.*—This company recently began operations at Pierce. It is expected the pumping plant will be on the ground and ready to run next month.

*Sonora.*—A strike of good concentrating ore is reported made recently on this property above Burke. J. F. Moffatt, one of the owners, is manager.

## INDIANA.

*Oil Production.*—During April the oil produced by Indiana wells amounted to 757,745 bbls., valued at $830,802, an average per day of 25,258 bbls. The total output of Indiana wells for the past four months was 2,985,695 bbls., valued at $3,176,504.

PERRY COUNTY.

(*From Our Special Correspondent.*)

*Cannel Coal Company.*—This company, with principal offices in Tell City, is opening coal mines in three different places in this county.

## KANSAS.

LEAVENWORTH COUNTY.

*Home-Riverside Coal Mining Company.*—Under Sheriff T. J. Brown sold recently at auction 5,496 shares of the stock of this company to D. A. McGibben for $825. In all $549,400 of the total capital stock of $1,000,000 was sold. Col. McGibben, with his original holdings, now has $822,700 of the stock, and a controlling interest in the mine.

## MICHIGAN.

COPPER—HOUGHTON COUNTY.

*Tamarack Mining Company.*—This company held its annual meeting at Boston recently and elected the following directors: Albert S. Bigelow, William J. Ladd, Joseph S. Bigelow, David M. Anthony, Edward S. Grew, J. Henry Brooks and William E. Parnell.

(*From Our Special Correspondent.*)

*Arcadian.*—This mine is shipping 150 tons of rock daily to the mill at Grosse Point, one stamp being used part of the time. The output in April was 22 tons of refined copper.

*Atlantic.*—The April production was 306¾ tons of mineral; 35 drills are operating and rock shipments average 1,375 tons daily.

*Calumet & Hecla.*—This company's sawmill at Shelldrake, near Sault Ste. Marie, in Chippewa County, has started up. The plant cuts timber for the mine, which is towed to the head of Torch Lake, then taken over the private railroad to Calumet. Five heads in the addition to the Hecla stamp mill at Lake Linden are in commission, and the 6th will start within a few days. A 200-ft. extension to No. 2 coal dock at Lake Linden is being built. The extension will increase the storage capacity 30 per cent. President Alexander Agassiz and Consulting Engineer E. D. Leavitt are at the mine on their regular spring trip.

*Isle Royale Consolidated.*—The April product was 100 tons of refined copper. One stamp at the mill is in commission, treating 500 tons of rock per day. Operations are confined to No. 2 shaft, where 18 drills are in commission, 15 being engaged in stoping.

*Osceola Consolidated.*—The output in April was 600 tons of refined copper.

*Quincy.*—This mine produced 1,020¼ tons of mineral in April. President W. R. Todd, of New York, has been inspecting the mine and mills.

*Tamarack.*—This mine produced 650 tons of refined copper in April.

*Winona.*—The sinking of the new No. 3 shaft has been started. It is located 1,650 ft. south of No. 2 shaft. The mine produced 100 3-5 tons of mineral in April.

*Wolverine.*—This mine produced 499½ tons of mineral in April.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

*Mohawk.*—The April production was 395 tons of mineral.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

*Adventure Consolidated.*—The estimated April output was 130 tons of refined copper.

*Mass Consolidated.*—This mine produced 107 tons of refined copper in April.

*Michigan.*—A shaft is 1,550 ft.; B shaft, 1,650 ft. deep, and 12 drills are in commission. The foundation for the new shaft and rock house for A shaft is completed. Excavating for the foundation is in progress at B shaft. Each rock house will be fitted with two rock crushers 18 by 24 in., and one 13 by 20 in.

## MONTANA.

*Mahnes Process.*—In the United States Court at Helena an appeal to the Circuit Court of Appeals at San Francisco in the suit of Franklin Farrell and others against the Boston & Montana Copper Company, and which involves the right of the defendants to use the Mahnes process of converting copper matte into metallic copper, has been granted.

BEAVERHEAD COUNTY.

*Indian Queen.*—It is reported that Butte men are going to erect a 30-ton smelter near this mine, at a cost of about $30,000. Mr. Owsley, of Dillon, is to have charge of the plant, which will treat custom ore as well as ore from the Indian Queen Mine.

(*From Our Special Correspondent.*)

*Ajax Mining Company.*—Articles of incorporation have been filed. The property consists of the Ajax and other claims near Fox, at the head of Swamp Creek, a tributary of the Big Hole River, and it is 100 miles from the railroad. A 5-stamp mill was placed on the property last season by the owners, J. E. Morse, A. J. Noyes and William Stanchfield. The new company is stocked at $1,500,000. The management intends to put in a much larger mill. The incorporators are J. E. Morse, A. J. Noyes, B. F. Wright, William Roe and Ed Wines, all of Dillon, and Senator Lee Mantle and former Lieutenant-Governor A. A. Spriggs, of Butte.

DEER LODGE COUNTY.

(*From Our Special Correspondent.*)

*Allen Gold Mining Company.*—The dredge on the lower end of French Gulch will start the season's work at once. New lips have been placed on the buckets and other repairs made. This is the third season for the boat. The hydraulic operations of the same company will also start now. The quartz properties at the head of the Gulch will be worked as soon as the snow will permit.

*Southern Cross.*—H. L. Frank, it is understood, will put new machinery on this property, near Georgetown, 18 miles above Anaconda. The property some years ago was operated on quite an extensive scale, but owing to the stamp mill not making a close saving it was closed down.

FERGUS COUNTY.

This county produced in April, according to the returns of the Helena Assay Office, $109,127, compared with $19,531 in April, 1902. The total receipts of the assay office from Montana mines in April were $172,365.

(*From Our Special Correspondent.*)

*Ansonia and Stand Pat.*—These two claims adjoining the Barnes-King Group on the north have been bonded for a year to Salt Lake parties by the owners, Dr. Lang, H. O. Wareham and J. L. Stewart, of Lewiston, for $100,000. It is understood that the Salt Lake people will erect a cyanide plant.

GALLATIN COUNTY.

*Bozeman Onyx Company.*—This company has been organized, with Col. O. P. Chisholm as president. It will develop 80 acres of land near Manhattan, which is said to contain deposits of fine onyx. A road will be built from Manhattan and machinery installed.

*Montana Corundum Company.*—It is reported that this company is to reopen its mines under new management, Manager L. S. Ropes having resigned.

JEFFERSON COUNTY.

*Bertha.*—This mine at Corbin is being developed by the Helena & Livingston Mining and Reduction Company. A large force of men is employed, and ore will be shipped soon.

*Liverpool and Washington.*—The shaft in these mines in Lump Gulch is to be sunk to the 800 level.

*Rose Gold Mining Company.*—This company, incorporated under the laws of New Jersey, has increased its capital stock from $1,000,000 to $2,000,000, and appointed Benjamin F. Maiden, of Bozeman, as agent in Montana. The property consists of eight mining claims and two millsites.

*Tyler.*—This group of claims, 2 miles from Montana City, has been bonded to Jones & Martin, of Great Falls, for $100,000, the bond to run to October, 1904. A large force has been put on development.

LEWIS & CLARKE COUNTY.

*Piegan.*—Plans are being prepared by the Allis-Chalmers Company for a stamp mill and cyanide plant for this mine, in the Marysville District.

MADISON COUNTY.

*Alder Gulch.*—The Gordon dredge has begun work on the Conroy placers, near Virginia City, and the second dredge will be placed in operation by the middle of June.

*Alder Gulch.*—The placers in this locality are to have a busy season, there being a large amount of hard snow on Mount Baldy. The three dredge boats at the mouth of the gulch are all busy.

*Chicago Mining and Development Company.*—This company has one dredge working in Alder Gulch.

*Clipper.*—This mine, at Pony, has 40 men extracting ore of good grade.

*Consolidated Fluming Company.*—This company, with property on Alder Gulch, has begun operations with a small force.

*Pony District.*—Thirty-five men are developing the Galena Mine, in this district, and considerable good ore is being shipped as a result of development work.

*Red Bluff Mining Company.*—This company, at Pony, has mastered the water question, and is producing sufficient ore to keep its mill in operation.

MISSOULA COUNTY.

*Tarbox.*—A new hoisting plant of 30 h.p. is being installed on this lead property near Saltese. The company is working three 8-hour shifts, and sinking at the rate of about 80 ft. per month, and intends sinking to the 400-ft. level before cross-cutting. Richard Daxon is manager.

PARK COUNTY.

*Helena & Livingston Smelting and Reduction Company.*—This company, at a recent meeting held in Helena, decided to acquire additional coal lands at Cokedale. The company now controls and owns six miles of coal veins near Livingston. It is likely that several hundred men will be employed soon at Cokedale. Former Governor S. H. Hauser is president of the company.

SILVER BOW COUNTY.

*Butte & Boston Company.*—An appeal granted in the suit of this company against J. J. Forbes, executor, and F. A. Heinze, intervenor, was from an order of Judge Knowles approving the acounts of Receiver John S. Harris, of the Snohomish and Tramway mines at Butte.

(*From Our Special Correspondent.*)

*Reins Copper Company.*—This new corporation purposes to develop the Combination quartz claim, adjoining the Piccalo on the east. The capital stock is $1,500,000, divided into 1,000,000 shares of $1.50 each. John P. Reins, who owned the property which is practically undeveloped, owing to litigation, becomes president of the company. George W. Stapleton is vice-president; Thomas M. Hodgens, treasurer; W. W. McDowell, secretary. The directors are Paris Gibson, Great Falls; B. F. White, Dillon; Hiram W. Knowles, Fayette; Mr. Harrington, Butte; A. H. Barret, Helena; R. B. Smith, Butte, and Guy W. Stapleton, Butte.

*Speculator.*—The Lee Mantle suit against this property for a 1-16 interest, has been dropped by the plaintiff. Judge Clancy on May 2 signed the judgment in favor of the Largey estate, thereby quieting the title, setting forth that the defendants had been owners of the property since January, 1887.

## NEVADA.

EUREKA COUNTY.

*Whalen Consolidated.*—This copper mine, at Alpha, has been attached for various sums owing for labor performed.

LINCOLN COUNTY.

*Pinoche Consolidated.*—Cortlandt E. Palmer, of Colorado Springs, Colo., has completed an examination of

this property. The mine is under bond to C. O. Whittemore, of Salt Lake, and Eastern associates.

*Bamberger-De La Mar Gold Syndicate.*—The new mill at De La Mar started on May 7.

## NEW MEXICO.

### SIERRA COUNTY.

*(From Our Special Correspondent.)*

*Black Peak Gold and Copper Mining Company.*—This company, another lately organized concern, with Boston capital, has acquired six claims known as the Black Peak and Washington groups. There are now 2,000 ft. of development work done, blocking out about 5,000 tons of ore.

*Las Animas Gold and Copper Mining Company.*—This company, with a capital of $1,000,000, is preparing to carry on extensive development work on three patented claims at Hillsboro, known as the Wicks Group. W. W. Williams, of Hillsboro, is general manager. The present plan calls for a mill of 50 tons daily capacity.

*Prosper Gold Mining and Milling Company.*—This company, operated by Cincinnati, O., men, with A. J. Hirsch as general manager, is prepared to handle 20 tons of ore daily. The company is developing water supplies by underground storage. A 5-ft. Huntington mill and two Wilfley tables are being installed.

*Sierra Consolidated Milling Company.*—This company has been capitalized in New York City for $3,000,000. It has purchased the Snake and Opportunity groups, containing a score or more claims, and a reduction plant may be built. R. H. Hopper is the general manager.

*South Puercha Mining and Milling Company.*—This Cincinnati, O., organization is reported to have struck good ore in the Great Eastern Mine. There are two parallel leads, about 60 ft. apart.

## OREGON.

### BAKER COUNTY.

*Baker City Sampling Works.*—This plant, for a number of years owned and operated by Bela Kadish, has been leased to the Oregon Smelting and Refining Company. Mr. Kadish, after an extended European trip, will devote his time during the life of the lease to mining.

*Midway.*—This mine, it is said, is to be equipped with a hoisting plant capable of sinking to 1,000 ft.; also a 5-drill Ingersoll-Sergeant air compressor and an electric light equipment.

### JACKSON COUNTY.

*Bowden Mining and Milling Company.*—This company has its stamp mill at the mine in the Blackwell District, near Gold Hill, completed. The cost was about $5,000. A full force of men is at work.

### JOSEPHINE COUNTY.

*St. Helena & Galice Mining Company.*—This company, at its annual meeting at Portland, elected Milton E. Wilder president and A. B. Cousin secretary and general manager.

## PENNSYLVANIA.

### BITUMINOUS COAL.

*Mount Equity Coal and Coke Company.*—George Hicks, of Coalmont, has sold to this company 3,416 acres of coal land for $50,000. This tract of land, which is underlaid by three veins of coal, extends unbroken from Coalmont to Riddlesburg.

*Winding Ridge Coal Company.*—This company, with headquarters at Confluence, has begun developing a tract of 1,000 acres of coal land on the Chesapeake & Ohio branch, 6 miles south of Confluence. The directors are William Creehton, of Rockwood, president; James Kirkpatrick, of Casselman, vice-president; E. L. Milliron, Rockwood, secretary and general manager; Dr. C. J. Hemminger, Rockwood, treasurer, and E. M. Binder, of Philadelphia.

## SOUTH DAKOTA.

### CUSTER COUNTY.

*(From Our Special Correspondent.)*

*Crown Mica Company.*—The new machinery is in place, and the company is preparing to get out mica. This is one of the oldest mica mines in the Black Hills, and was a producer 20 years ago, when the product was hauled several hundred miles in wagons.

### LAWRENCE COUNTY.

*(From Our Special Correspondent.)*

*Clover Leaf Gold Mining Company.*—O. B. Amsden, formerly superintendent of the Belt Development Company, is now superintendent of this company, and operations have been resumed.

*Echo Mining Company.*—Funds have been raised for exploring the property, near Garden City.

*Morning Glory Mining Company.*—The tunnel, near Gardner City, has been driven 153 ft.

*Lexington Hill Gold Mining Company.*—This company is still bonding property in the Spruce Gulch region.

### PENNINGTON COUNTY.

*(From Our Special Correspondent.)*

*Golden West Mining Company.*—A series of tests will be started at the little Chilean mill on ore from the Yellow Bird and Benedict groups before June 1. The plant will be operated by water power.

## TEXAS.

### JEFFERSON COUNTY.

*(From Our Special Correspondent.)*

*Beaumont Oil Field.*—George A. Burt has transferred the large refining plant now building and all appurtenances to H. G. Bayne, president of the Seaboard National Bank.

New regulations regarding fires and lighting on Spindletop have been promulgated, and it is hoped that they are drastic enough to lessen the dangers. New pumping outfits—to take the place of the ones destroyed—are being installed, but it is likely that May shipments will be less than those for April, which aggregate 675,000 bbls. Water shipments during the last few days of the month were in excess of 100,000 bbls. Crude is firm at 73@74c. per bbl.

### NAVARRO COUNTY.

*(From Our Special Correspondent.)*

*Corsicana Oil Field.*—Many contracts for wells in the Powell field are being let, and all rigs are busy. Powell crude is selling at the wells for 85c. per bbl., while Corsicana light crude has advanced 2c. to $1.08 at the well.

## UTAH.

### SALT LAKE COUNTY.

*(From Our Special Correspondent.)*

*Ore and Bullion Settlements.*—The Salt Lake banks made these settlements for the week ending May 7: Gold, silver, lead and copper ores, $168,300; base bullion, $140,300; gold bars, $121,800; total, $430,400. These figures do not include the products of the independent smelters.

### BEAVER COUNTY.

*(From Our Special Correspondent.)*

*Beacon.*—This property, in the South Star District, has been bonded to L. G. Brown, of Salt Lake, and Eastern associates, for $35,000. W. J. Murray and Wallace Martin, of Eldora, Ia., are interested. Important developments have been made recently. The ores carry values in gold, silver, copper and lead.

*Blackbird Copper Company.*—The name of this company is soon to be changed to Beaver Valley Copper Company. Dr. P. A. H. Franklin is manager.

*Blue Jay Extension.*—A good body of ore on the 300-ft. level of this property has been driven on 26 ft. and 100 tons of ore have been hoisted for shipment. A gasoline hoist is to be installed.

*Cactus.*—Manager M. M. Johnson states that work is progressing on both ends of the tunnel, more than a mile long, which connects with the 600-ft. level of the main working shaft. The proposed 1,000-ton concentrator and smelter will be at the mouth of this tunnel. Plans for these plants are nearing completion, and upon the return of Samuel Newhouse from Europe it is expected that the contracts will be let. Bids have already been received for the construction of the new electric power plant.

*Copper Mountain.*—The new gasoline hoist is in commission. Development is progressing.

*Horn Silver.*—Two cars of zinc ores have been shipped from this mine at Frisco, noe going to Belgium, the other to Kansas. There are great quantities of this stuff, and the management is experimenting to find the most economic method of treatment.

*Kitty Clough.*—Assays of ore taken from the recent strike gave returns of 2.88 oz. gold and 3.5 oz. silver.

*Majestic Copper Company.*—At the annual meeting in Denver on May 4, 548,000 shares out of 600,000 shares, were represented. The directors elected were: William B. Mucklow, George E. Keith, H. C. Bradley, F. F. Fuessenich, George H. Risley, George I. Spear, H. G. Howe, John H. Alexander and A. B. Lewis. The new board organized with W. B. Mucklow, president; George E. Keith, vice-president; Thos. M. Smith, secretary and treasurer; Charles M. Merriam, assistant secretary and treasurer. Col. W. A. Farish will continue as general manager. The new smelter will not go into commission for probably 60 days. The retiring president, A. B. Lewis, will devote his attention to other Beaver County projects.

### IRON COUNTY.

*(From Our Special Correspondent.)*

The Rice Brothers, of Stateline, have bonded their group of eight claims to a New York and Denver syndicate for a reported consideration of $30,000. The property was examined last week by C. M. Shaw and W. F. Baker, of Denver. A 2-compartment shaft will be sunk.

*Ophir.*—This mine, at Stateline, will probably resume soon. The obligations of the company are being met.

### JUAB COUNTY.

*(From Our Special Correspondent.)*

*Tintic Shipments.*—During the week ending May 8 the mines of Tintic shipped 147 car-loads of ore to the Salt Lake smelters, as follows: Bullion-Beck, 2; Centennial-Eureka, 32; Carisa, 4; Dragon Iron, 19; Gemini, 13; Grand Central, 33; Lower Mammoth, 4; Mammoth, 11; Star Consolidated, 4; Uncle Sam Consolidated, 8; Victor Consolidated, 9; Tetro, 2; Yankee Consolidated, 6.

*Four Metals.*—The stockholders of this Deep Creek property, on May 7 elected these directors: H. H. Brandeis, John Goodlett, Frank Severance, Omaha, Neb.; Leopold Hahn, Hastings, Neb.; Atlee Hart, Dakota City, Neb.; George L. Moats and D. J. Evans, of Salt Lake. The organization was completed by the selection of H. H. Brandeis, president; Joseph Giles, vice-president; George L. Moats, treasurer and general manager, and R. P. Hills, of Salt Lake, secretary. The new board has ordered the immediate construction of a 50-ton mill.

*Lower Mammoth.*—An important find of ore 4 ft. thick is reported at the 1,100-ft. level of the shaft. It assayed from 60 to 100 oz. silver to the ton.

### SALT LAKE COUNTY.

*(From Our Special Correspondent.)*

*Bingham Consolidated.*—The newly elected directors have organized by chosing the following officers: President, E. L. White; vice-president, W. S. McCornick; treasurer, O. E. Weller; secretary, H. N. Wesson.

Copper bullion shipped during the week ending May 8 amounted to three cars, 180,162 lbs.

*Columbus Consolidated.*—Shipments have started from this Alta Mine, in which some extensive orebodies have been developed. Three car-loads sold on the Salt Lake market netted the company $700 per car. The company has announced its intention of building a 100-ton concentrating mill this year. Manager Tony Jacobson is expected to return to Salt Lake in a few days from a conference with Eastern directors.

*Highland Boy Smelter.*—Copper bullion shipments during the week ending May 8 were five cars, or 301,500 lbs.

*United States Smelter.*—Copper bullion shipments for the week ending May 8 amounted to three cars, 181,621 lbs.

### SUMMIT COUNTY.

*(From Our Special Correspondent.)*

*Comstock.*—The new concentrating mill at the mine, in Thayne's Canyon, near Park City, is in commission. Morris Dusseldorf, of Salt Lake City, is manager.

*Daly.*—Owing to trouble with surface water work has been suspended in the new shaft.

*Ontario.*—The annual report of Superintendent C. L. Rood, of this mine at Park City, shows that the receipts from all sources during the year ending December 31 last were $356,968, and that the total profits were $50,967. At the close of 1901 the company had a reserve fund of $402,829, which at the end of 1902 amounted to only $267,642, showing that over $129,000 of the $180,000 paid in dividends had come from the reserve. The cash on hand at the end of the year was $186,877. Superintendent Rood says that some cheaper method of treatment must be devised before the mine can be expected to yield large returns. Greater cost of mining and low price of silver have been against the company. The matter of building a concentrating plant capable of working the ores on an extensive scale is being considered.

*St. Louis-Ontario.*—A new steam hoist is being installed at this Park City property. H. C. Brownlee, of Salt Lake, is manager.

## FOREIGN MINING NEWS

## CANADA.

### BRITISH COLUMBIA—ROSSLAND DISTRICT.

*Rossland Ore Shipments.*—The coke shortage is still felt, however, the Trail Smelter is maintaining three copper furnaces in operation by extra precautions. At Northport coke is coming in fast. The shipments for the week ending May 2 are given as follows: Le Roi, 3,120; Le Roi II, 700; Center Star, 2,040; War Eagle, 990; White Bear, 25; Velvet, 150; Kootenay, 220; total, 7,245 tons; year to date, 129,454 tons.

### NORTHWEST TERRITORY.

*Frank Coal Mines.*—Conditions are reported more favorable every day as regards the safety of Turtle Mountain. Small slides are occasionally coming down, but no danger is apprehended. An examination has been made by Government Surveyor Elliott, from Regina, also by Surveyor McKenzie and Inspector of Mines Smith, and a report will be submitted in a few days. H. L. Frank states that it is the intention of the coal company to have three entries into the mine, two tunnels and one shaft.

## MINING STOCKS.

(Full quotations are given on pages 770 and 771.)

**New York** May 13.

The coppers are generally quiet, and fluctuations in market quotations are fractional. At one time room traders endeavored to raise Amalgamated, but could not sustain the price above $67, and on Tuesday sales were made at $65⅝. Anaconda reapeared, not to excite trading, but to remain on the list; it sold at 106⅞ per cent ($26.72). Tennessee changed hands at $28½@$28⅝, and Greene Consolidated, of Mexico, at $22⅛@$22⅝. Dealing in White Knob, of Idaho, was actuated by the sudden demand for the company's bonds, which are convertible into stock. Brokers made good profits in buying the bonds and selling the stock against them, owing to the difference in value. This arbitrage business, however, has been stopped since the company bid up the price of the bonds. The stock sold at $15⅛@$18, and the 6 per cent bonds, around 130. United, of Montana, was weak at $16.

Comparatively little is being done in the gold and silver stocks. Standard Consolidated, of California, made another sale at $3, just in time for the 10c. quarterly dividend. Portland, of Cripple Creek, Colo., sold at $1.45; El Paso, at 58c., and Isabella, at 19c. Small Hopes, of Leadville, shows a transaction at 45c. Ontario, of Utah, brought $5.75, and Horn Silver, $1.25.

Comstocks are quiet, as very few of the higher-priced stocks are selling ex-assessment.

Further business has been done in Silver Hill, of Nevada, at 90c.

Auction sales were 1,200 shares Tombstone Consolidated Mines Company, of Arizona, Limited, and $12,000 special contract gold registered 6 per cent bonds, at $14,000 for lot.

**Boston.** May 12.

*(From Our Special Correspondent.)*

Things do not improve in the mining share market, and a period of pronounced dullness is certainly on. The market is extremely narrow and entirely professional. Fluctuations are within narrow limits, and the gains of one day are often wiped out the next. Notwithstanding this, the general tone is strong and very few stocks are pressed for sale. The strength of the metal market is undeniable. Mining companies are reported sold up through July.

There is talk of bull pools in Allouez, and Winona mining stocks, but there is little evidence of their being in operation. The former is firm around $7@$7.25, and Winona around $12@$12.50. Talk on the latter, with favorable market conditions, is strong. The matter of the erection of a mill by Winona will soon be taken up by the management, but money will have to be raised, probably by assessment before anything can be done. At present the company has close to $150,000 on hand, and is paying expenses from mining operations. Old Dominion is strong around $18@$18.25. Centennial moved up $1.25 to $26.75, but lost it. Mohawk, on which there is much bullish talk, has been firm at $51.50@$52.25. Osceola stiffened $1.50 to $68.50, but reacted $1. Tamarack has lost $5 to $140. The Tamarack annual meeting was held last week, and Capt. William E. Parnell was elected to succeed his father, deceased. No. 5 shaft, which is now down almost 5,200 ft., has been very disappointing. President Bigelow could not promise a dividend before the latter part of the year.

Parrot holds strong around $28@$28.50; Bingham at $30.50@$31. The strength of Utah is remarked, the quotation varying from $29.37½@$29.87½. Copper Range Consolidated is the best trading stock, although very erratic. It keeps just about so close to Amalgamated, and follows the course of the latter. It advanced $2.25 to $66.25 this week, but closed almost the same as a week ago at $63.87½.

Consolidated Mercur has been weak of late, on talk that dividends will be passed in order to increase milling facilities. The stock has declined to $1.31¼. Dominion Iron has lost $2.50 to $28, and Dominion Coal, $4.75 to $106. Adventure touched $8.75; Michigan, $8; Atlantic, $11.75, and Trinity, $8.75. American Zinc has advanced $1.50 to $12.25.

**Colorado Springs.** May 8.

*(From Our Special Correspondent.)*

The market during the past week has been characterized by light trading, with prices in the mines list holding steady and strong. The prospect list has been fairly active and several of its stocks have scored material advances. Beacon Hill stocks are the popular traders just at present, owing to the good showing now being made in that section by the C. K. & N. and El Paso companies. The drainage tunnel, whose portal is on the south slope of this hill, is also lending its influence to the general advance of Beacon Hill stocks.

Elkton has manifested some strength during the week, selling from 37 up to 38c., and closing at the latter figure. El Paso has held steady all week at 58¾@59c., as has also C. K. & N., which remains stationary at 19c. bid. Gold Dollar Consolidated proved popular during the week, selling at 5¼c. a week ago and 5⅝c. to-day. This is a Beacon Hill company, and rumors of a rich find in the 600-ft. level of the mine had a bullish effect on the shares. Golden Cycle shares were also in good demand at advanced prices. A week ago the stock sold at 74½c., and to-day at 78c. Portland has been fairly steady, selling from $1.40@$1.38 all week. Isabella and Vindicator sold at 17 and 95c., respectively.

**Salt Lake City.** May 9.

*(From Our Special Correspondent.)*

The stocks sold on the Salt Lake Stock Exchange during the week ending May 9, brought the sum of $175,892. The real feature was found in Lower Mammoth, which recorded some sensational advances. The stock rose from 68c. on Monday to $1.13 on Saturday. Heavy purchases were made by several officers of the Consolidated Mercur, who did so after a recent inspection. During the week 90,300 shares were transferred. Daly West has been only in slight demand, but the stock shows some improvement over a week ago, although it did not reach $48. Daly-Judge was taken only in limited quantities. Very little activity in this stock is expected until the new mill is tried after the introduction of the Sherman slimes tanks and other equipment in successful operation at the Daly West plant. Consolidated Mercur continues sluggish, although the company is producing just as much as it ever did. Ben Butler, of Bingham, has been an active trader this week, and the price has advanced. Sacramento, of Mercur, was active during the early part of the week, but closed lower. There has been no local demand for United States Mining, and those who hold it here are not making any offers. Star Consolidated has been marketing some good ore lately, and that stock has been held in favor. Grand Central, although in little demand, ended the week stronger. The option for a control of this mine, which is held by those closely identified with the Bingham Consolidated, is still pending.

**San Francisco.** May 9.

*(From Our Special Correspondent.)*

The market has been dull, with few changes, and business on rather a small scale. The new Tonopah stocks do not seem to be very good sellers.

Caledonia sold at $1.65@$1.70; Ophir, $1.60@$1.65; Consolidated California & Virginia, $1.30@$1.35; Mexican, 90@95c.; Sierra Nevada, 70c.; Overman, 40@45c.; Yellow Jacket, 41c.; Crown Point, 27c.

While sales of oil stocks were moderate in amount, prices were firm. Kern River brought $13; Twenty-eight, $4.10; Home, $2.70; Monte Cristo, $1.25; Caribou, 80@85c.; Monarch, 50@55c.; Claremont, 35c.; Independence, 15c. The tendency seemed to be toward the higher-priced stocks.

## COAL TRADE REVIEW.

New York, May 14.

ANTHRACITE.

The demand for anthracite continues strong and widespread. The miners have generally returned to work and the Conciliation Committee of operators and representatives of the United Mine Workers is preparing to take up alleged grievances. The outlook is for the Conciliation Committee having plenty to do this summer, though no doubt many questions will be brought before the committee, which that body under the award of the Anthracite Strike Commission will have no authority to take up. The committee's work will, however, very likely lessen the number of small strikes that have been so common during the past four years, since the miners must be at work in order to have a standing before the committee, and thus they are less likely to act hastily. Just what would happen if the proposed 8-hour bill should be signed by the Governor of Pennsylvania remains to be seen. The bill would drive a horse and cart through the findings of the Anthracite Strike Commission.

The shipments from the mines for April amounted to 5,044,800 tons, and for the four months of this year 21,291,900 tons, or at the rate of some 63,900,000 tons for the year. The outlook is, barring labor disturbances, that shipments this year will exceed 60,000,000 tons.

Trade in Lake Superior territory is brisk, and dealers as never before seem inclined to get in supplies as early as possible. Consequently, coal is moved from the docks at the head of the lakes as fast as it arrives. In Chicago territory also dealers and consumers are thinking of laying in supplies early, and the demand from out-of-town points is very strong. As a result, supplies on Chicago docks are very limited, receipts not being sufficient to keep docks supplied with all sizes. Along the lower lakes and in Canadian territory demand is active. Freight rates from Buffalo are 40c. to Duluth and 50c. to Chicago and Milwaukee. Shipments up the lakes are likely to increase with the mines in full operation. Along the Atlantic seaboard demand promises to be strong until July anyway, and probably it will be all summer. Dealers at Boston, New York and Philadelphia report householders laying in supplies against next winter's needs as never before, the experience of last winter leading them to buy early and to buy enough. The May prices, f.o.b. New York Harbor shipping ports for free-burning white ash coal, are: Broken, $4.35; egg, stove and chestnut, $4.60.

BITUMINOUS.

The Atlantic seaboard bituminous trade is perhaps a shade more active than last week. Clearfield grades have sold as low as $2.40, f.o.b. New York Harbor shipping port, a price which calls for 90c. at the mines, and few of the producers of the lower grades of coal can work at a profit at any such price as that. The current f.o.b. price, New York Harbor, is nearer $2.60; but owing to troublesome restrictions placed on shippers some coal has been sold at tidewater at below the cost of production, the producers not caring to incur demurrage. Producers generally are curtailing shipments and many report business quieter than in several years. Even the producers of better grades feel the dullness, though less than operators shipping poorer grades, since the former receive orders from people who are willing to store coal against the time when transportation will give trouble, this summer or fall. In fact, it would seem to be good policy for consumers generally to take advantage of present prices, since it is tolerably certain that the railroads will have trouble in giving prompt service by and by.

In the far East trade is dull, and orders even for the better grades are few, but consumers seem a little more inclined to listen to the argument of poorer traffic facilities in a few months. Along Long Island Sound a little more coal is taken, as compared with last week, but the demand from that territory recently has been poorer than in many months. At New York Harbor points trade is quiet; lack of storage facilities keeps buying from falling off much. Demand from all-rail territory is about half what it normally should be, and there is reason to believe that in some cases at least stocks put in last winter are utilized, but coal is offered at such low mine prices that consumers feel easy about getting enough later.

Transportations from the mines to tidewater continues prompt, coal running through in less than a week. The railroads are permitting a few cars to go off the main lines over foreign roads to territory ordinarily not open for shipments. Car supply is fairly well up to demand; as shipments are more or less curtailed, car needs are correspondingly limited. In the coastwise vessel market, vessels are scarce, and in demand, including sailing craft, sound and harbor barges—probably because of the general desire to get anthracite forward and the resulting delays from craft waiting for cargoes at loading ports. The current rates from Philadelphia are: Providence and Long Island Sound ports, 95c.@$1; Boston, Salem and Portland, $1.15@$1.25, according to size of craft; Portsmouth, $1.25; Newburyport, Gardner and Bangor, $1.35@$1.40; Saco, $1.40 and towages. From the further lower ports rates are 10c. higher. New York Harbor quotations are: Boston, Salem and Portland, $1@$1.25; Providence, New Bedford and Long Island Sound, 75c.

**Birmingham.** May 11.

*(From Our Special Correspondent.)*

The coal production in Alabama is strong yet, though one mine has shut down because of differences with the miners employed there, and another mine has temporarily closed down for want of orders. The mines at Virginia City, in Jefferson County, have been idle since last Tuesday. The United Mine Workers of America formed a local among the miners at this place, and a committee sent to the superintendent to inform him of the fact, was told that the company would not recognize the union, hence the shut down; 225 men are affected.

The official call for the miners' annual wage scale convention has been issued, the meeting to be held in Birmingham June 15, with the joint miners and operators' conference a week later. There are indications that all will not be settled as quietly as was at first believed.

Mr. J. M. Gray, recently apointed Chief Mine Inspector in Alabama, took possession of his office today, succeeding J. deB. Hooper, who goes into the mining business for himself, he having some coal properties in Walker County. J. M. Russell, becomes one of the assistant inspectors.

**Chicago.** May 11.

*(From Our Special Correspondent.)*

Except for the brisk trade in anthracite, which continues undiminished, or but slightly diminished, from the heavy record of the last week in April, the wholesale coal business of Chicago shows the usual spring slackness. Both city and country business are only fairly good, as regards bituminous; sales of smokeless continue comparatively heavy and aparently indicate that users of steam coal learned the value of this product last winter, and are seeking it for permanent use. This seems also the case with domestic users, who have found smokeless a good substitute for anthracite. For tug use, especially, the smokeless grades appear to be finding favor on account of the city's constant crusade against violators of its anti-smoke ordinances.

Heavy shipments of anthracite are coming in daily

by lake, but not enough to supply the demand without delay. Lake rates for coal have not advanced, as other freight rates have, and there is every probability that much business will be done on the lakes this season. The condition of the river, as usual, is bothering vessel men and firms receiving coal by boat; the two tunnels continue, notwithstanding all the talk of heroic remedial measures last winter, to form an absolute barrier to the passage of vessels drawing more than 16 to 17 ft. of water. On this account, it is said, much more coal for the Northwest is going to other ports this year.

Anthracite continues at $6.10, the May price; smokeless is in the neighborhood of $4 for Pocahontas and New River, with possibly a cut of 10@20c. on some orders; Hocking and Youghiogheny are in fair demand at $3.50@$3.60; Indiana and Illinois lump are $2.15@$2.40 for the best grades; mine-run from the mines of these two States is $1.75@$2. Smithing coal is brisk at $4@$4.50.

**Cleveland.** May 12.

*(From Our Special Correspondent.)*

The coal situation in this territory is all that could be desired. The railroads during the past two months have performed wonders, and have relieved themselves of much of the charge that they are incapable of handling the business that is given to them. The supply of coke has been so plentiful since the freight congestion was relieved that the market is easing up considerably, and the quotations have been lower. The prices are getting down more nearly to the normal level. In many instances the furnaces have been able to get so much ahead of their running needs that many of them have started to collect stock piles, and are doing so without robbing any of the other consumers of their supply. The domestic coal trade in this territory is in about the same condition. The local yards are getting ready their summer stocks now, and the factories have all the material they can use. The lake situation is also improving. Hitherto it could not be said that the supply was normal, but now the conditions are changing rapidly, and the business is resuming its midsummer volume much sooner than usual. It is expected that by the end of this week there will be normal conditions throughout the trade. Lake cargoes have been about equal to the supply of boats and the rates have held firm. The shippers have not yet all made their season contracts, but many of them are doing so now, and this matter will be out of the way soon. Lake coal prices remain at $2.45, f.o.b. lake ports, for Pittsburg and West Virginia lump, and $2.35 for Ohio lump. The rates of carriage remain 40c. to Duluth and 50c. to Milwaukee. Lake coal is coming forward without interfering with the ore movement or the shipment of general freight in the territory. This makes affairs entirely normal.

**Pittsburg.** May 12.

*(From Our Special Correspondent.)*

*Coal.*—The railroads are greatly assisting the coal companies in getting coal to the lake ports for shipment to the Northwest market. The movement of freight through the Conway yards on Sunday was unusually heavy, the large percentage being coal. The Fort Wayne has retained the 32 heavy freight locomotives which were borrowed from the Pittsburg Division of the Pennsylvania Railroad three weeks ago, and now are used on the branches which carry lake coal. The only complaint shippers now have is the demand of the railroads that cars be unloaded immediately upon their arrival. In many cases this is inconvenient, as boats are not ready to receive the cargoes. The mines continue in full operation, and railroad cars are up to the requirements. The Monongahela River Consolidated Coal and Coke Company has plenty of empty coal boats and barges and will be prepared for a heavy shipment on the next rise in the rivers. Prices remain unchanged.

*Connellsville Coke.*—The supply of coke now exceeds the demand and all furnaces are receiving full requirements as the railroads are handling all freight offered. No change in quotations for the second half has been announced. In its last report the *Courier* gives the production for the region in the previous week at 240,000 tons. The shipments for the week were 11,606 cars, distributed as follows: To Pittsburg and river tipples, 3,142 cars; to points west of Pittsburg, 5,760 cars; to points east of Connellsville, 1,704 cars.

**San Francisco.** May 9.

*(From Our Special Correspondent.)*

Trade has been quiet, with about the usual arrivals. Stocks are good, except in Eastern coals.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington and New Wellington, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Spring and Sunnyside. Eastern coal in cargo lots is at present nominal, but quotations are $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo, $7.50; Wallsend, $7.50.

**Foreign Coal Trade.** May 14.

There is nothing new to report here, either in import or export trade.

Coal production in Germany for the three months ending March 31 is reported as follows, in metric tons:

| | 1902. | 1903. | Changes. |
|---|---|---|---|
| Coal | 25,080,178 | 28,300,905 | I. 3,220,727 |
| Brown coal (lignite) | 10,205,395 | 11,140,143 | I. 934,748 |
| Total coal mined | 35,285,573 | 39,441,048 | I. 4,155,475 |
| Coke made | 2,099,430 | 2,688,336 | I. 588,897 |
| Briquettes made | 2,040,312 | 2,475,839 | I. 435,527 |

The coal trade shows a marked recovery from the depression of last year. A considerable share of the gain was due to the improvement in the iron trade.

The gas works at Florence, Italy, have just closed contract for their supply for the year to be furnished by mines in Durham, England. Last year these works made some experiments with American coal, but this year no tenders were received from any American companies, the reason for which can be readily understood.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of May 2, that the general condition of the Welsh coal market is unchanged and the firm tone is maintained throughout. Quotations are: Best Welsh steam coal, $3.66@$3.72; seconds, $3.60; thirds, $3.48; dry coals, $3.30; best Monmouthshire, $3.30@$3.42; seconds, $3.12; best small steam coal, $2.28; seconds, $2.04; other sorts, $1.92.

The above prices for Cardiff coals are all f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The outward freight market is unchanged and rates continue easy. Tonnage is in good supply. Some rates quoted are from Cardiff: Marseilles, $1.50; Genoa, $1.38; Naples, $1.38; Las Palmas, $1.56; St. Vincent, $1.68; Rio Janeiro, $2.28; Santos, $2.64; Buenos Aires, $1.80.

## IRON TRADE REVIEW.

New York, May 14.

The iron market continues to be essentially a waiting one. But little buying of pig iron is reported, although foundry requirements are known to be large, and few concerns have supplies running from the third quarter. The reduction made a month ago by the Southern furnaces gave many buyers an idea that concessions would be in order all along the line. This view is not naturally held by the furnace men, and the result has been almost a deadlock. All sorts of rumors are abroad, but must be accepted with a great deal of caution. Dispatches from Pittsburg, which appeared in the Eastern papers this week, report that a general reduction is about to be made, but these are doubtless in the nature of feelers, and have no special basis of fact behind them. The situation is very much the same in steel billets, but it is safe to say that no concessions have been actually made as yet. German billets, however, are being offered in the East at a drop of 50c@$1 from recent figures. The conditions as to delivery, however, are not altogether satisfactory.

In finished material heavy buying of bars and plates seems to be over for the present. Sheets continue firm, especially in galvanized. Structural material is seriously affected for the time being by the numerous strikes in the building trade. It begins to look as though some time would be required for the settlement of these labor troubles, and buyers are holding off accordingly. In steel rails there is a heavy demand for girder rails for electric railroads; it begins to look as though some of these projects would have to be postponed on account of the impossibility to getting deliveries this year. It is understood that offers of German basic-steel girder rails are being made, but there seems to be some difficulty in agreeing upon terms and deliveries.

**Birmingham.** May 11.

*(From Our Special Correspondent.)*

The waiting game on the part of the consumers continues. There is some accumulation of iron to be noticed, and there is more iron being stacked up in the furnace yards hereabouts now than has been seen in over 16 months. This accumulation is not causing any apprehension on the part of the manufacturers, and they are firm in a declaration that there will be no further reductions in prices. One furnace went into blast during the past week. The Woodstock Iron Company at Anniston will have one of its furnaces ready in the next few days. The Sheffield Coal and Iron Company is repairing two of its furnaces in the Sheffield and Florence District, practically rebuilding them. None of the new furnaces will go into operation until after next month. The Tennessee Coal, Iron and Railroad Company blew in Little Belle furnace at Bessemer the past week, after a thorough repairing. The second Alice furnace will not be blown in until the furnace now in operation has about run its limit and needs repairing. Oxmoor furnace will not be ready for the torch, according to the latest information, for 60 days, if then. The Sloss-Sheffield Steel and Iron Company has all seven of its furnaces in operation, one of the city furnaces one day during the past week turning out 202 tons of iron a day, against 175 tons, its usual daily capacity.

The following (Western) quotations are given: No. 1 foundry, $18@$19; No. 2 foundry, $17.50; No. 3 foundry, $16.50@$17; No. 4 foundry, $16@$16.50; gray forge, $15.50@$16.50; No. 1 soft, $18@$19; No. 2 soft, $17.50.

In finished iron and steel there is much activity. The steel plant is doing well. The loss of the contract with the Alabama Steel and Wire Company has not disturbed the production, and shipments of billets continue brisk. As far as can be ascertained, there is no intention of reducing the production. The steel rail production is holding steady. The steel rod, wire and nail mills are in operation in all departments, except the rod department. The Alabama Steel and Wire Company has some trouble at its coal mines, the miners being out because of a failure to recognize the union. The rolling mills in this district are working, the Bessemer mills of the Tennessee Coal, Iron and Railroad doing a heavier work during the past week than for some time. Foundrymen and machine shop proprietors report a slight falling off in their lines. It is the regular summer trade, however, and there is no surprise. Cast iron pipe is in good demand, and the factories appear to be enjoying good business.

**Chicago.** May 11.

*(From Our Special Correspondent.)*

Sales of pig iron for the last week are reported rather better, as a whole, than the sales of the previous week, but business is still dull, compared with the record of the season in previous years. The consumer is still holding off, in the apparent belief that the price is going down with a thud soon, this condition being apparently the continued effect of the Southern Combination's cut a month ago. This cut, so far as can be learned, is held responsible here for most of the present dulness. Buyers are still looking only for the needs of the present, and those who hold that sales have been too far in the future heretofore for sound business, console themselves now with the reflection that things are bound to even up in the year, whichever plan is adopted. The change from one plan to another, however, everyone admits, is productive of trouble for both buyers and sellers. Small lots and quick delivery are sought almost universally now.

Prices continue ostensibly as last week: $20.85 for Southern and $21 for Southern No. 2 on delivery in the last half of the year, with 50c.@$1 premium for quick delivery. There is reason to believe that on both future and spot delivery prices have been considerably cut in the effort to sell iron. Coke is somewhat lower, first-class 72-hour foundry being quoted to-day at $7.15, while a range of $7.15@$7.65 will express the market of the week. The supply of coke, it is hardly necessary to say, with the above quotations, is plentiful, and there is every reason to believe that it will continue to be plentiful for several weeks if not months.

**Cleveland.** May 12.

*(From Our Special Correspondent.)*

*Iron Ore.*—Lake freights are stable without a change. A few of the shippers who have not yet made contracts for the year are expected to cover before the week is out. Ore is not yet moving freely, but quicker shipments will be seen before the beginning of next week when the regular mid-season activity is expected to start in. Lake rates are unchanged either on wild or contract cargoes, being 85c. from Duluth, 75c. from Marquette and 65c. from Escanaba. The prices have held as they were being based on $4.50 for bessemer old range and $4 for bessemer Mesabi.

*Pig Iron.*—Buying is limited now, in foundry grades, to material for May and June delivery, and there is very little left to sell. Occasionally there is a lot of 100 tons or less which is disposed of at the old prices. The buying for second half is dead for the time being, as consumers are waiting for better prices. Producers see that they have orders ahead for three months and are not disturbed, as in many cases they are unable to make delivery fast enough on present contracts. Consumption being so heavy, and without abatement; they are willing to trust the future for prices. Production is now normal and the furnaces are so far removed from the possibility of fuel shortage that they are able to collect stocks of material, and this is being done generally. The prices hold as they were: No. 2 foundry, $22; Southern Ohio, for first half, and $21@$21.50 for second half, Valley furnace. There is a good call for spot basic, with no material available, and consumers urging shipments on old cotnracts. The sales have been stopped altogether because there is no material for present shipment and nothing is asked for second half delivery. Prices hold nominally as follows: $21.50@$22, Valley furnace, for first half, and $20, Valley furnace, for second half. Buyers of bessemer are not on the market and no business is done. The prices are

nominal as follows: $21.50@$22, Valley furnace, for first half, and $20.50@$21 for second half.

*Finished Material.*—Buying of sheets has been the feature. During the past three or four weeks this material has been in better demand than at any time for an equal number of months, and the trade is strong. The market has an upward tendency, but without any particular change in prices, the basis here being on material out of stock. No. 27 black sheets are bringing 3.10@3.25c., Cleveland. The structural trade shows increasing signs of dullness. Buying has not started in, whereas it has been expected long before this, and the specifications on old orders are not as heavy as they might have been. The trade is not looking very bright and premiums on mill sales are unknown now. The larger mills are making as prompt delivery as the consumers need. The jobbers are getting a little business at their prices. The quotations are 1.60c., Pittsburg, on mill sales, and 2.15@2.25c., out of stock. Plates have been fairly strong with the larger mills, but specifications on old contracts have been light. The smaller mills are getting a moderate amount of business only, and are getting premiums which, however, are weakening. The larger mills quote 1.60c., Pittsburg, while the smaller ones are getting 2c., Cleveland, which, however, is being shaded on good orders. The bar iron demand is better, but with good specifications bringing a slight reduction as the mills are anxious to get them. Prices hold at 1.60c., Pittsburg, for bessemer, and 1.70c., Pittsburg, for open-hearth, with bar iron bringing 1.80@1.85c., Youngstown. The demand for rails is heavier than the mills desire. Shipments on old orders are being urged, and the demand is strong. Many of the projects which have made inquiries will not pan out, but some more legitimate business could be done. Light rails are in good demand. Prices are $28 for standard and $36 for light rails, both based on Pittsburg.

**Philadelphia.** May 13.

*(From Our Special Correspondent.)*

*Pig Iron.*—Pig iron brokers and agents in this market refuse to admit that there is any permanent decline in prices. No. 1 foundry is in less request, but there are a number of large consumers here who would buy if they felt present prices would hold. Gray forge is unsettled, because most mills are supplied for the present, and because it is a question whether bar iron quotations are going to hold. Quotations may be given as follows: No. 1X foundry, $22.50; No. 2X foundry, $21; No. 2 plain, $20.50; gray forge, $19 @$20; basic, $20. The lowest quotation for No. 3 Middlesboro at retail is $20.50; at wholesale, $17.50; Scotch is quoted all the way from $22@$23; foreign bessemer is quoted at $20@$20.50.

*Steel Billets.*—Heavy dealings have taken place in foreign steel at somewhere near $29 delivered. Negotiations are now pending for deliveries at $28.50. This business rests with the question of freights. Domestic makers of basic open-hearth steel have done a fair business this week at $32, and from all accounts they are getting all the business they want.

*Merchant Bar.*—Bar iron is threatened with a drop, and the rumor has gone forth that certain concessions are being made quietly. Steel bars are under better inquiry than refined iron, and there is a scramble for some of the larger and more desirable orders. The tone of the market is weak.

*Skelp Iron.*—Skelp iron shows active inquiry, but buyers want more favorable terms.

*Old Rails.*—Inside quotations for old iron rails are $24.50; for old steel rails, $21.50.

*Scrap.*—There is the usual scramble for heavy steel scrap. Low phosphorus would bring $28.50; for heavy steel, $20 is offered, though it is not known that anything has been sold at less than $21. Old steel and iron axles are not in the market. Choice railroad scrap is out of sight. Some country scrap is occasionally picked up at about $20.

**Pittsburg.** May 12.

*(From Our Special Correspondent.)*

The pig iron market has settled down as to sales, but the outlook is entirely satisfactory to furnace men. They are in no particular hurry to sell the product for the balance of the year, as they are sold up for three or four months ahead, and it is known that a number of steel works are short of iron. During the week the merchant furnaces received an inquiry from a large steel interest for 50,000 tons of bessemer pig. The price named was not satisfactory, and the order was not placed. The tonnage was to have been in equal deliveries through the second half. While the name of the concern was not made public it is known that it is short of iron and must soon place an order for part or all of the amount. Consumers are evidently delaying the placing of orders for the last half until the United States Steel Corporation comes into the market. The Pig Iron Committee of the Corporation is scheduled to meet in New York to-day to act on some offers of iron for early delivery. It is possible that something may be done on second half iron. If the Corporation covers its requirements for the last half, buying will be greatly stimulated. The present demand is for early delivery, and one interest that has an order in for June delivery is urging shipment during this month. The waiting condition of the pig iron market is attributed to the action of the Southern Furnace Association in shading prices on April 1 in the Pittsburg District, together with the easy movement of coke during the past month. It is confidently predicted that the lowest price for bessemer for fourth quarter delivery will be $19 at Valley furnaces, and that a higher rate will rule before the close of the year. The situation in foundry iron is somewhat mixed, and furnaces are not urging sales. While the foundries are well covered a few contracts were booked during the week at the ruling prices, and it now seems likely that the shading of prices expected by July 1 will not be as great as was predicted. The gray forge market continues firm, although there is but little business doing. All the blast furnaces are in full operation, and the threatened trouble with the workers is not likely to prove as serious as was anticipated. At a meeting of the executive council of the National Association of Blast Furnace Workers and Smelters held at Ironton, O., last week the question of demands for the year beginning June 1 was considered. It was decided to ask for an advance in wages at some furnaces in order to equalize rates and definite action on the question of a general advance was postponed.

There is a continued scarcity of steel and the market is strong. Some sales have been made, but prices have not been shaded. The market in all finished lines is firm, and prices are unchanged. Specifications against contracts for structural material, plates and bars have been unusually heavy during the week, and the finished mills are certain to be kept busy during the rest of the year. There has been no change in sheets or tin-plate, but the demand is good and prices are firm. The American Tin Plate Company has sold up to the middle of July at $3.80 a box, and is not booking any business beyond August 1. This company seems anxious to settle the wage question for another year, and was the first to ask for a conference with the Amalgamated Association of Iron, Steel and Tin Workers when the convention closed. The date was fixed for to-day, and the officers of the Association and the committee left here last night for New York. The only change made in the scale by the Amalgamated Association was a revision of Clause No. 5, which caused some trouble during the year. Unless the American Tin Plate Company makes demands for some undesirable changes there will be no difficulty in reaching an agreement. The workers' committee was given power by the convention to remove the limit or make whatever changes it may consider necessary. This will remove one important point on which trouble was expected. An advance in prices may be ordered when the wage question is settled. Arrangements are now being made for the conference on the iron scale. It will likely be held in Detroit before the close of this month, and there may be some difficulty in reaching an agreement unless the workers make concessions in the demands decided on the convention. The bi-monthly examination of sales sheets of bar iron on which the wages of the puddlers and finishers for May and June are based will be made in Youngstown this week at the offices of the Republic Iron and Steel Company. There is not likely to be any change and an advance or a reduction would come as a surprise.

*Pig Iron.*—While there has been a number of inquiries for bessemer pig iron but one sale was made. It was for 1,000 tons for delivery in the second half at $19.50, Valley furnaces. For delivery in the fourth quarter, $19@$19.25 is quoted. The foundry and gray forge markets are firm. Some sales of foundry were made and No. 2 is quoted at $21@$22, Pittsburg, and for the Southern product, $20.85@$21.35, Pittsburg, is asked. Northern gray forge continues at $20.25, and Southern at $19.85, Pittsburg.

*Steel.*—Bessemer billets are firm at $31@$31.50, delivered at Pittsburg, and open-hearth billets are 50c. higher. Some sales of bessemer billets were made during the week. Mills are well sold up for several months, and prices remain unchanged in plates and steel bars. The official price is 1.60c., but premiums are paid for prompt shipment.

*Sheets.*—The demand for sheets continues to improve. The leading interest is sold up for three months, and has not ordered an advance. No. 28 black sheets are still quoted at 2.75c. and galvanized 3.85c. Some independent mills are getting premiums ranging from $2 to $5 a ton.

*Ferro-manganese.*—There is no change in the situation, the English product being quoted at $50@$52.50.

**St. Louis.** May 11.

*(From Our Special Correspondent.)*

*Pig Iron.*—Conditions in the St. Louis District are very slow. There is no pressure to buy or sell. This condition exists, although good authorities say that foundries and other buyers of iron are not covered to more than 20 per cent of their requirements, for the second half of the year. The discrimination of $1 a ton in favor of Eastern buyers is quite disregarded in this market, and current sales of No. 2 foundry are made on the basis of $16.50, Birmingham. Agents are not anxious to sell even at this figure. Deliveries are good, and there is no premium on spot iron. Current quotations are: No. 1 foundry, $20.75@$21.75; No. 2 foundry, $20.25@$21.25; gray forge, $18.25@$18.75; Southern soft, Nos. 1 and 2, sell at same price as corresponding grades of foundry.

*Finished Material.*—Buying has been very slack. Jobbers report good business in the West, but in the South and Southwest buying is slow and collections poor. Structural material is quiet on account of labor troubles in the building trade. Bars are selling at 1.82c. from mill, and 2.25c. out of store. A little business has been done in sheets on the basis of 3.15c. for No. 27 black sheets out of store.

*Scrap.*—Demand for scrap is very good. The greater pressure is for heavy steel, which is in demand at $20.50@$21.50.

**New York.** May 14.

*Pig Iron.*—The market continues weak, with no prospect of immediate improvement. We quote for early delivery, Northern iron at tidewater: No. 1X foundry, $21; No. 2X, $20.25; No. 2 plain, $19.50. For Southern iron on dock, New York: No. 1 foundry, $21; No. 2, $20.50; No. 3, $20.

*Bar Iron and Steel.*—We continue to quote for large lots on dock: Refined bars, 1.90@2c.; soft steel bars, 1.80@1.90c.

*Plates.*—The local trade shows considerable improvement. Most boiler shops have adjusted their troubles with employees, and are very busy. Sheared plates are quoted: Tank, ¼-in. and heavier, at 1.90 @2c.; flange, 2@2.05c.; marine, 2.10@2.20c.

*Steel Rails.*—The quotation remains $28 for standard sections, f.o.b. mills for 1903 delivery; light rails, $33@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

*Structural Material.*—The labor situation continues threatening, affecting demand. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c.

## CHEMICALS AND MINERALS.

(See also Prices-Current on page 772.)

New York, May 13.

While it is true that sales in certain localities have been curtailed by labor troubles, the suspension is only temporary, and will be more than compensated for when buying is resumed. Fortunately, this is the quiet season for many industries; otherwise there might be a general demoralization of the market. Prices, with few exceptions, are easy, and for some important heavy chemicals indicate keen competition.

Two of the largest metallic oxide and color works in the central West have united. The purchase of the Ferrous Pigment Company, of Cleveland, O., by the Cleveland Color Company will facilitate competition with others.

The producers of asphalt from the residuum of crude petroleum in California have organized the California Asphaltum Sales Agency, with headquarters in San Francisco. Besides agreeing on prices the agency will endeavor to market a better quality of oil asphalt than has heretofore been sold, and consumers will be instructed in its proper use and application. The new schedule of prices, f.o.b. San Francisco, is as follows: "L" (flux) grade, $13 per short ton; "D," $13; "B," $15; "C," $14. The cost of freight to Missouri River points is $11 per ton, which would make the Eastern delivery quotation about $26 per ton. It is claimed that California oil asphalt can be sold in this market at a lower price than the best imported mineral. Competition, however, will be keen with the Trinidad refined asphalt, which is shipped to New York at only $1.75 per ton freight, and sells at $35.

*Magnesite.*—A cargo of 1,000 tons crude magnesite and 50,000 bricks has just arrived from Greece, to be delivered on contract. Demand, particularly for bricks, is growing rapidly, and until recently has been met principally by domestic makers, who employ Grecian and Styrian calcined magnesite. Since the Societe des Travaux Publics et Communaux, of Athens, Greece, has increased its producing capacity, however, importers have crossed swords in competition with the American refractories combination. As a result imported Grecian magnesite brick of the best quality and standard size is offered in wholesale quantities at $155 per 1,000, f.o.b. New York, packed in iron strapped crates containing 30 bricks each. This price compares with $200, f.o.b. Pittsburg, asked by domestic makers for a brick made on the same principle as the imported; and for a mixed brick, containing Grecian and Styrian magnesite, $155@$160 is quoted. It is believed that these prices may be shaded on desirable business. These bricks are used chiefly for lining open-hearth steel furnaces and cement kilns.

*Cyanide of Potassium.*—Imports are small, and export trade is quiet. The quotation remains at 20c. per lb., f.o.b. New York.

*Bleaching Powder and Chlorine.*—To say the bleaching powder trade is demoralized simply emphasizes the fact that importers are cutting prices to the hilt in accordance with the policy inaugurated by Continental makers against their British competitors. Incidentally, domestic makers are compelled to meet importers. The result is low prices to the consumers. New York prices for foreign makes are $1@$1.20 per 100 lbs., according to test and quantity, while domestic sells at 95c.@$1.12½, f.o.b. works. These prices will no doubt be shaded confidentially. Seems makers of old process bleach will be forced from the field if the electrolytic works persist in reducing prices. Chlorine is unchanged at 30c. per lb. for imported liquor, and 10c. per lb. for water, f.o.b. New York.

*Copper Sulphate.*—Demand is mostly of a retail character, and is satisfied by domestic makers at $5@$5.25 per 100 lbs., f.o.b. New York. Export business is being done at $4@$5, principally at the former figure.

*Acids.*—Deliveries on contract are moderate. Prices continue as below per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

| | | | |
|---|---|---|---|
| Muriatic, 18°.. | $1.50 | Oxalic com'l... | $5.25@$5.50 |
| Muriatic, 20°.. | 1.60 | Sulphuric, 50°, | |
| Muriatic, 22°.. | 1.75 | bulk, ton.... | 13.50@14.50 |
| Nitric, 36°.... | 4.37½ | Sulphuric, 60°. | 1.05 |
| Nitric, 38°.... | 4.75 | Sulphuric, 60°, | |
| Nitric, 40°.... | 5.00 | bulk, ton .... | 18.00@20.00 |
| Nitric, 42°.... | 5.37½ | Sulphuric, 66°, | 1.20 |
| | | bulk, ton .... | 21.00@23.00 |

*Brimstone.*—Arrivals recently have been larger than usual, but as the bulk of the brimstone is under contract prices for spot delivery are of little importance. For spot and nearby best unmixed seconds, $22.25@$22.50 per ton have been named. Shipments command more attention, and are quoted at $22@$22.25, though it is known business has been solicited at $21.75. Best thirds are about $1 less than seconds.

*Pyrites.*—Sellers are enjoying a good business at remunerative prices. Those handling imported pyrites have strengthened their views, and although they have sold fines below 10c. per unit, are obliged to ask more now, owing to the higher ocean freight rates. Charters from Huelva, Spain, to Atlantic ports are being taken at 11@11s. 6d. ($2.64@$2.76); but importers are indisposed to contract for a very large tonnage at these figures, hoping for lower rates. Domestic producers are also busy, and inquiries have been made recently for supplies in the West, near enough to transportation to encourage consumption. At present sulphuric acid makers there obtain much of their raw material from the sulphide concentrates from Colorado, and from the zinc ores of Missouri and Kansas. An attempt will be made by producers of pyrites in British Columbia to supply the demand in California and other Pacific Coast States. These mines were opened about two years ago, and shipments of pyrites made to chemical works in Victoria, B. C. The consumption of sulphur in California has heretofore been met by imports of Japanese brimstone, but steps are now being taken to increase the local production of pyrites. Perhaps when the consumption of sulphuric acid is of sufficient importance the sulphurous fumes from the smelters may be utilized to advantage.

We quote: Domestic pyrites, $5 per ton for lump ore, f.o.b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 11@12c. per unit for lump, and 10@10½c. for fines, delivered at Atlantic ports.

*Nitrate of Soda.*—This market has taken another upward turn, spot now being quoted at $2.05 per 100 lbs., arrivals $2, and futures $1.95. Several elements are responsible for this firmness, namely, an improved situation on the coast and increased consumption, an advance in ocean freight rates, and the announcement that the third year's exports have been fixed by the combination at 31,750,000 quintals (1,443,182 long tons). This is 240,000 qtls. (10,909 tons) more than the quantity consumed in the second year ending March 31, 1903—an increase which some think insufficient to meet the present extraordinary demand. Judging from past experience, however, we believe the exports for the third year will be less than the quantity agreed to. Production, on the other hand, will likely be increased. What the consumption will be it is hard to prophesy, although the first three months of this year showed an increase of about 32 per cent, being 13,001,750 qtls. (590,989 tons), as against 9,892,000 qtls. (449,636 tons) in the same time of 1902.

The recent disastrous fire at Pisagua, Chile, has not interfered with nitrate shipments from that port, as had been feared.

*Sulphate of Ammonia.*—Sales of good gas liquor are being made in New York at $3.12½@$3.15 per 100 lbs., according to position. Production is increasing, not only in the United States, but also in Great Britain, Germany and one or two other Continental European countries. The world's output last year was something like 519,500 long tons, which showed an increase as compared with 1901. This indicates a vast improvement in the recovery of gases from the by-product coke ovens and blast-furnaces.

*Phosphates.*—There is a strong undercurrent toward higher prices, and the latest advices from Europe intimate an advance there. In fact, miners are so busy making shipments on contracts taken some time ago that most deliveries on new orders will not be made until early fall. In April the high-grade rock people of Florida shipped something like 68,000 tons, of which 31,900 tons went through Fernandina, 20,043 tons from Savannah, and the balance from other ports. The movement from Fernandina and Savannah—the two leading ports—since January 1, was as follows, in long tons:

| | 1902. | 1903. | Changes. |
|---|---|---|---|
| Fernandina | 61,000 | 54,990 | D. 6,010 |
| Savannah | 47,064 | 58,886 | I. 11,822 |
| Total | 108,064 | 113,876 | I. 5,812 |

The increase this year is equivalent to about 5 per cent. Leading consumers were Germany, Sweden and Belgium.

At mining centers talk of good fellowship is general, convincing the public that a better business policy is afoot. It is interesting to remark that the older miners are the most anxious to increase their prestige. This is shown by the purchase or so-called consolidation of well known properties. In Florida the land pebble properties owned by Mr. Louis McLain, consisting of the Florida Engineering Company and the Phosphoria Phosphate Company have passed into the hands of Mr. Joseph Hull, the owner of the Prairie Pebble Phosphate Company, which acquired lately the Land Pebble Phosphate Company. These four properties, estimated on last year's shipments, give Mr. Hull control of fully 36 per cent of the land pebble business, a good part of which is done abroad.

| Phosphates | Per ton F. o. b. | United Kingdom or European Ports. Unit. | Long ton. |
|---|---|---|---|
| *Fla. hard rock (77@80%).. | $7.00@$7.50 | 7@7½d. | $10.99@11.77 |
| *Fla. land peb. (68@73%).. | 3.50@ 3.75 | 5½@5¾d. | 7.70@ 8.05 |
| †Tenn., (78@82%) export. | 3.75@ 4.00 | 6½@7d. | 10.40@11.20 |
| †Tenn., 78% domestic..... | 3.50@ 3.75 | ..... | ..... |
| †Tenn., 75% domestic..... | 3.25 | ..... | ..... |
| †Tenn., 73@74% domestic... | 2.70@ 2.95 | ..... | ..... |
| †Tenn., 70@72% domestic... | 2.45@ 2.70 | ..... | ..... |
| ‡So. Car. land rock..... | ....@ 3.25 | ..... | ..... |
| ‡S. Car. riv. r'k (55@60%) | 2.75@ 3.00 | 5⅛@5⅝d. | 5.95@ 6.24 |
| Algerian (63@70%) ..... | ..... | 5¼@6⅛d. | 6.83@ 8.02 |
| Algerian (58@63%) ..... | ..... | 5⅛@6d. | 6.15@ 7.26 |
| Gafsa (Tunis) ..... | ..... | 5⅛@6d. | 6.15@ 7.26 |
| Christmas Is. (80@85%).. | ..... | 7¼@7⅝d. | 12.04@12.87 |

* Fernandina, Tampa, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

## Liverpool. April 29.

*(Special Report of Joseph P. Brunner & Co.)*

*Soda Ash* is firmly held. For tierces, nearest range is as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash; ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. under prices for tierces.

*Bleaching Powder* is quite idle, and prices are nominal anywhere from £3 10s.@£4 5s. per ton, net cash, for hardwood, as to market.

*Sulphate of Ammonia* is slow of sale and easier at £13 7s. 6d.@£13 10s. per ton, less 2½ per cent for good gray 24@25 per cent in double bags, f.o.b. here.

*Nitrate of Soda* is in moderate request, but spot quotations are steady at £9 15s.@£10 per ton, less 2½ per cent for double bags, f.o.b. here, as to quality.

## METAL MARKET.

New York, May 14.

### Gold and Silver Exports and Imports.
At all United States Ports in March and Year.

| Metal | March. 1902. | March. 1903. | Year. 1902. | Year. 1903. |
|---|---|---|---|---|
| Gold: | | | | |
| Exports.. . | $4,432,946 | $1,042,596 | $15,072,101 | $2,826,111 |
| Imports.... | 2,636,313 | 4,472,061 | 5,739,067 | 8,031,666 |
| Excess. | E $1,796,633 | I. $3,429,463 | E. $9,333,034 | I. $5,405,555 |
| Silver: | | | | |
| Exports ... | $3,301,291 | $3,063,749 | $11,751,886 | $11,107,679 |
| Imports.... | 2,306,499 | 1,479,771 | 6,419,823 | 5,060,743 |
| Excess. | E.$994,792 | E. $2,183,978 | E. $5,332,063 | E. $6,046,936 |

### Gold and Silver Exports and Imports, New York.
For the week ending May 13, and for years from January 1:

| Period. | Gold. Exports. | Gold. Imports. | Silver. Exports. | Silver. Imports | Total Excess, Exports or Imports. |
|---|---|---|---|---|---|
| Week .. | $1,555,498 | $30,897 | $278,665 | $200 | E. $1,803,066 |
| 1903.. ... | 3,936,948 | 2,815,399 | 6,500,665 | 700,101 | E. 6,922,013 |
| 1902..... | 16,455,601 | 1,044,869 | 11,619,277 | 474,448 | E. 26,554,961 |
| 1901..... | 18,122,994 | 1,064,138 | 13,464,915 | 1,552,561 | E. 28,971,210 |

### Prices of Foreign Coins.

| | Bid. | Asked |
|---|---|---|
| Mexican dollars | $.42 | $.44 |
| Peruvian soles and Chilean pesos | .38 | .40 |
| Victoria sovereigns | 4.85 | 4.88 |
| Twenty francs | 3.86 | 4.83 |
| Twenty marks | 4.74 | 3.80 |
| Spanish 25 pesetas | 4.78 | 4.82 |

### Financial Notes of the Week.

Business is rather quiet, and the numerous strikes and labor troubles are having a depressing effect. Gold exports have begun this week, some $3,000,000 having been taken for shipment to France, besides $500,000 to Buenos Aires.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending May 9 gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

| | 1901. | 1902. | 1903. |
|---|---|---|---|
| Loans and discounts . | $897,713,900 | $901,938,000 | $923,080,200 |
| Deposits ..... | 977,490,900 | 960,235,600 | 915,834,700 |
| Circulation ..... | 31,081,100 | 31,229,600 | 43,948,900 |
| Specie ..... | 179,760,700 | 170,490,400 | 169,051,700 |
| Legal tenders ..... | 72,739,500 | 73,029,500 | 69,936,800 |
| Total reserve ..... | $252,500,200 | $243,519,900 | $238,988,500 |
| Legal requirements .. | 244,372,725 | 240,058,900 | 228,958,700 |
| Balance surplus ... | $8,127,475 | $3,461,000 | $10,029,800 |

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

| | 1902. Gold. | 1902. Silver. | 1903. Gold. | 1903. Silver. |
|---|---|---|---|---|
| N. Y. Ass'd. | $170,490,400 | ..... | $169,051,700 | ..... |
| England ... | 178,841,950 | ..... | 176,790,810 | ..... |
| France ..... | 513,985,650 | $222,224,275 | 488,900,210 | $222,303,415 |
| Germany ... | 189,760,000 | 70,185,000 | 161,825,000 | 56,860,000 |
| Spain ..... | 70,520,000 | 92,515,000 | 72,480,000 | 101,775,000 |
| Neth'l'ds ... | 23,910,000 | 32,890,500 | 19,674,500 | 32,668,500 |
| Belgium ... | 16,090,000 | 8,045,000 | 15,223,335 | 7,611,665 |
| Italy ..... | 80,740,000 | 10,777,500 | 88,495,000 | 11,322,000 |
| Russia ..... | 368,930,000 | 42,160,000 | 377,360,000 | 40,365,000 |

The returns of the Associated Banks of New York are of date May 9, and the others May 7, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The market for silver after some recession has got more firm again. There seems to be demand enough to hold prices around current figures.

The United States Assay Office in New York reports receipts of 48,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to April 30 are reported by Messrs. Pixley & Abell's circular, as follows:

| | 1902. | 1903. | Changes. |
|---|---|---|---|
| India ..... | £2,741,585 | £2,585,500 | D. £156,085 |
| China ..... | 16,500 | 138,081 | I. 121,581 |
| The Straits ..... | 250 | 148,391 | I. 148,141 |
| Total ..... | £2,758,335 | £2,871,972 | I. £113,637 |

Receipts for the week were £55,000 in bar silver from New York, and £6,000 from Australia; total, £61,000, and £27,000 Mexican dollars from New York. Shipments were £98,925 in bar silver to Bombay and £15,000 to Calcutta; total, £113,925.

Indian exchange continues comparatively easy, as money is quite abundant at the present time in India. The Council bills offered in London were taken at an average of 15.91 per rupee. There is little buying of silver for export to India on account of the higher price, but the India Council, it is reported, has bought considerable quantities for coinage purposes.

The Director of the Mint on May 7 bought 310,770 oz. fine silver for Philippine coinage at an average of 54.495c. per ounce.

The Treasury Department's estimate of the amount and kind of money in the United States on May 1 is as follows:

| | Total. | In Treasury. | In circulat'n |
|---|---|---|---|
| Gold coin (inc. bullion in Treas. ..... | $1,267,303,579 | $262,539,660 | $623,132,469 |
| Gold certificates .... | ..... | ..... | 381,631,459 |
| Silver dollars ..... | 552,268,056 | 19,037,932 | 73,986,478 |
| Silver certificates ... | ..... | ..... | 459,243,640 |
| Subsid. silver ..... | 101,141,553 | 8,831,987 | 92,309,566 |
| Treas. notes of 1890 | 20,795,000 | 124,260 | 20,670,740 |
| U. S. notes ..... | 346,681,016 | 4,607,767 | 342,073,249 |
| Currency certif. .... | ..... | ..... | ..... |
| Nat. bank notes ..... | 391,151,728 | 9,845,606 | 381,306,122 |
| Total ..... | $2,679,340,932 | $304,987,212 | $2,374,353,724 |

Population of the United States May 1, 1903, estimated at 80,257,000; circulation per capita, $29.58. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the Treasury as assets of the Government does not include deposits of public money in National Bank Depositories, to the credit of the Treasurer of the United States, and amounting to $142,961,510.

The total amount in circulation May 1 shows an increase of $22,995,777, as compared with April 1; and an increase of $113,603,478, as compared with May 1, 1902.

## OTHER METALS.

### Daily Prices of Metals in New York.

| | —Silver— | | —Copper— | | | | —Spelter— | | |
|---|---|---|---|---|---|---|---|---|---|
| May | Sterling Exchange | N. Y. Cts. | London, Pence. | Lake, Cts. per lb. | Electrolytic, Cts. per lb. | London, £ per ton. | Tin, Cts per lb. | Lead Cts. per lb. | N. Y. Cts. per lb. | S. L. Cts. per lb. |
| | | | | 14⅝ | 14¾ | | | 4.30 | 5.60 | 5.40 |
| 7 | 4.88 | 54 | 24⅞ | @14¾ | @14⅞ | 61⅞ | 29⅞ | @4.35 | @5.65 | @5.50 |
| | | | | 14⅝ | 14¾ | | | 4.30 | 5.60 | 5.40 |
| 8 | 4.87⅞ | 54⅛ | 24⅛ | @14¾ | @14⅞ | 62⅛ | 30⅛ | @4.35 | @5.65 | @5.50 |
| | | | | 14⅝ | 14¾ | | | 4.30 | 5.60 | 5.40 |
| 9 | 4.87⅞ | 54⅛ | 24⅛ | @14¾ | @14⅞ | .... | 30 | @4.35 | @5.65 | @5.50 |
| | | | | 14⅝ | 14¾ | | | 4.30 | 5.60 | 5.40 |
| 11 | 4.87⅞ | 54 | 24⅛ | @14¾ | @14⅞ | 63⅛ | 30 | @4.35 | @5.65 | @5.50 |
| | | | | 14⅝ | 14¾ | | | 4.30 | 5.60 | 5.40 |
| 12 | 4.87⅞ | 53¾ | 24¾ | @14¾ | @14⅞ | 63¼ | 29⅝ | @4.35 | @5.65 | @5.50 |
| | | | | 14⅝ | 14¾ | | | 4.30 | 5.60 | 5.40 |
| 13 | 4.87⅞ | 54 | 24⅞ | @14¾ | @14⅞ | 63 | 29¼ | @4.35 | @5.65 | @5.50 |

**London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures**

*Copper.*—The firmer tendency of the speculative market in Europe has caused consumers to purchase somewhat more freely, and quite a fair business has resulted. If, as is expected, the better tendency from abroad continues, values of refined copper on this side will no doubt follow suit. So far, there has not been any change in the ruling quotations, which remain steady at 14⅝@14¾c. for Lake; 14⅜@14⅝c. for electrolytic copper in ingots, cakes and wirebars; 14⅛@14⅜c. in cathodes; 14c. for casting copper.

The market for standard copper in London, which closed last week at £62 2s. 6d., opened on Monday at £63 2s. 6d., and the closing quotations on Wednesday are cabled as £63 for spot, £63 for three months.

Refined and manufactured sorts we quote: English tough, £65@£66; best selected, £66@£66 10s.; strong sheets, £75@£76; India sheets, £72 10s.@£73 10s.; yellow metal, 6¼@6⅜d.

Imports and exports of copper in Germany for the three months ending March 31 are reported as follows, in metric tons:

| | 1902. | 1903 | Changes. |
|---|---|---|---|
| Imports | 16,500 | 18,528 | I. 2,028 |
| Exports | 1,098 | 1,342 | I. 244 |
| Net imports | 15,402 | 17,186 | I. 1,784 |

Imports of copper ores were 1,567 tons, against 857 tons in the corresponding period in 1901. Exports of copper ores were 4,211 tons, against 3,773 tons last year.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week ending May 12, and for the year to date, are reported by our special correspondents as follows, in long tons:

| Exports: | Week. | Year. |
|---|---|---|
| Austria | 165 | 2,411 |
| Belgium | 95 | 781 |
| France | 145 | 9,066 |
| Germany | 1,296 | 9,864 |
| Holland | 955 | 15,472 |
| Italy | 100 | 1,080 |
| United Kingdom | 59 | 6,195 |
| Other countries | 186 | 2,157 |
| Total copper | 3,001 | 47,026 |
| Matte | .... | 98 |
| Imports: | | |
| Copper | 767 | 7,667 |
| Matte | 164 | 464 |

The movement this week shows an increase. Of the imports of copper, 40 tons were from Japan, 668 tons from Mexico, and 59 tons from Great Britain. The matte received was from Great Britain.

*Chilean Copper Market.*—Messrs. Jackson Brothers report from Valparaiso, Chile, under date of April 4, that recent sales of bar copper have been 14,357 quintals, all for shipment to Europe. The average price was $34.85, Chilean gold, per quintal, f.o.b. Sales of matte had been about 300 tons at an average price of $15.26, Chilean gold, per quintal, basis of 50 per cent metal. No sales of copper ore were reported, and quotations were nominal at $1.95, Chilean gold, per quintal, basis of 10 per cent.

*Tin.*—The market has moved within very narrow limits, and nothing of special interest has transpired. The consumptive demand is very satisfactory. At the close we quote spot and futures at 29¾c.

The foreign market, which closed last week at £136 15s., opened on Monday at £135 15s., declined on Tuesday to £134 10s., and the closing quotations on Wednesday are cabled as £135@£135 2s. 6d., for spot, £134 5s.@£134 7s. 6d. for three months.

*Lead.*—The market is quiet, without any special feature. The closing quotations are given as 4.17½@4.27½c., St. Louis; 4.30@4.35c., New York.

The foreign market is dull, Spanish lead being quoted at £11 18s. 9d.@£12; English lead at £12 1s. 3d.@£12 2s. 6d.

Imports of lead into Germany for the three months ending March 31 were 12,605 metric tons, against 7,875 tons in the corresponding period last year. Imports of lead ores were 26,759 tons, against 18,721 tons last year. Exports of lead for the quarter were 6,020 tons, against 5,120 tons in 1901.

*Spanish Lead Market.*—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 25, that the price of silver for the week was 12.50 reales per ounce. Exchange stood at 34.26 pesetas to £1. The local quotation for pig lead on wharf was 69.75 reales per quintal of lead, which at current exchange is equivalent to £11 7s. 11d. per ton of 2,240 lb., f.o.b. Cartagena.

*Spelter* continues very firm indeed, and the demand seems to be as large as ever. The ruling quotations are 5.40@5.50c., St. Louis; 5.60@5.65c., New York. The foreign market is unchanged, good ordinaries being quoted at £21 15s.; specials, at £22.

*St. Louis Spelter Market.*—Our special correspondent reports that conditions are rather uncertain. Pressure during the week seems to have shifted from the buying to the selling side. One sale is reported of 50 tons at 5.35c., for June delivery. Spot spelter has been selling at 5.40c., East St. Louis. The Merchants' Exchange reports receipts of 54,950 slabs for the week. Shipments were 66,600 slabs.

*Silesian Spelter Market.*—Herr Paul Speier reports from Breslau, Silesia, under date of May 2, that prices are not strong. They are still much above those of a year ago, however. Current quotations are 22@22.25 marks per 50 kgs., f.o.b. Breslau; which is equal to 4.75c. per pound. Imports and exports in Germany for the three months ending March 31 were, in mertic tons:

| | —Imports.— | | —Exports.— | |
|---|---|---|---|---|
| | 1902. | 1903. | 1902. | 1903. |
| Spelter | 4,672 | 4,402 | 14,542 | 14,497 |
| Zinc sheets | 32 | 27 | 4,012 | 3,010 |
| Scrap zinc | 211 | 406 | 450 | 852 |
| Zinc white, etc. | 702 | 905 | 3,892 | 3,582 |
| Zinc ores | 15,017 | 14,006 | 15,491 | 11,413 |

There has been much inquiry for zinc-dust, especially for export. Quotations are about 39.50 marks per 100 kgs., f.o.b. works, which is equal to 4.26c. per pound.

*Antimony* is unchanged. We quote: Cookson's at 8@8¼c.; Hallett's at 6¾c.; United States, French, Hungarian, Italian and Japanese, at 6½c.

*Nickel.*—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

*Platinum.*—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

*Quicksilver.*—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is still $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. 6d. per flask, with the same quotation asked by second hands.

*Minor Metals and Alloys.*—Wholesale prices, f.o.b. works, are as follows:

| Aluminum. | Per lb. |
|---|---|
| No. 1, 99% ingots | 33@37c. |
| No. 2, 90% ingots | 31@34c. |
| Rolled Sheets | 4c. up |
| Alum-bronze | 20@23c. |
| Nickel-alum | 33@39c. |
| Bismuth | $2.10 |
| Chromium, pure (N.Y.) | 80c. |
| Copper, red oxide | 50c. |
| Ferro-Molyb'um (50%) | $1.25 |
| Ferro-Titanium (10%) | 90c. |
| Ferro-Titanium (20@25%. N. Y.) | 55c. |

| | per lb. |
|---|---|
| Ferro-Tungsten (37%) | 28c. |
| Magnesium | $2.75 |
| Manganese, pure (N.Y.) | 60c. |
| Mangan'e Cop. (20% Mn) | 32c. |
| Mangan'e Cop. (30% Mn) | 38c. |
| Molybdenum (Best) | $1.82 |
| Phosphorus | 45c. |
| American | 70c. |
| Sodium metal | 50c. |
| Tungsten (Best) | 62c. |

Variations in prices depend on size of orders, deliveries, etc.

### Missouri Zinc Ore Market. May 9.

*(From Our Special Correspondent.)*

The announcement during the week of a drop in the price of zinc ore influenced a number of producers to hold their ore, and as a consequence the shipment was 649 tons less than the previous week. The purchasing agent of one smelter cut the price $1 per ton to his regular customers on midweek offering, but the agent of another smelter secured a number of the choicest bins by raising the cut price 50c. per ton. Reports from all parts of the district are to the effect that offerings of 50c. and $1 per ton less were made the forepart of the week. One company that announced a $36 basis two weeks ago announced to-day that its purchasing agents would be in the market the coming week offering a $35 basis. The price is generally $1 per ton lower than two weeks ago, reductions having been gradually made here and there over the district until they have touched every point.

Leading members of the Missouri & Kansas Zinc Miners' Association, who watch market conditions pretty closely, assert freely that there is no condition in the present or prospective metal or ore situation to warrant the effort now being made by the smelters to still further lower the price. Since ore has been lowered the St. Louis price of spelter has weakened correspondingly. For several years it has been noted that no permanent reduction has been made in the price of spelter, except following a cut in the price of zinc ore, and spelter seldom advances except to follow the ore price up. With a weekly consumption of about 6,170 tons of zinc concentrates, largely dependent upon the Joplin District for a supply, and this supply limited to practically 5,000 tons per week, it may be readily seen that short buying to reduce the price will result in reduced stocks in a very few weeks, a point the Association has dwelt upon with the logical conclusion that producers hold the key to the situation by holding their ore until the reactionary demand shall return. Zinc ore has been none too high for the metal market, a fact emphasized by the metal following the ore down. With spelter $5.50 per 100 in St. Louis the ore market could rest around $38@$38.50 per ton of concentrates assaying 60 per cent zinc, and as a proof that these prices are equitable the sympathetic drop in the price of metal should be convincing.

Lead was steady in price and demand at $54.50 per ton delivered at the smelting works, or $54 per ton in the bin. One exception to this is reported from Cave Springs, where $58 per ton was paid for one bin of lead purchased by the agent of the Cherokee-Lanyon Company for use in the treatment of Western silver-bearing ore. The shipment of this ore was an increase of 125 tons over the previous week, notwithstanding weather quite damaging with continuous rains to the small producer. A year ago the highest price paid for zinc was $34 per ton, against $41 this year, and for lead $44.50 per ton—$7 less for zinc and $10 less for lead than the past week.

Following are the sales of zinc and lead from the various camps of the Joplin District for the week ending to-day:

| | Zinc, lbs. | Lead, lbs. | Value. |
|---|---|---|---|
| Joplin | 2,491,860 | 231,830 | $51,662 |
| Webb City & Carterville | 1,623,230 | 753,280 | 48,933 |
| Duenweg | 666,990 | 191,700 | 17,849 |
| Aurora | 705,800 | 22,460 | 13,085 |
| Galena-Empire | 505,220 | 87,120 | 11,217 |
| Oronogo | 401,070 | 19,180 | 8,194 |
| Carthage | 340,330 | 43,250 | 7,805 |
| Alba & Neck | 399,620 | ..... | 7,793 |
| Granby | 414,000 | 24,000 | 6,129 |
| Cave Springs | 146,940 | 48,450 | 4,407 |
| Spurgeon & Spring City | 188,830 | 18,260 | 3,707 |
| Zincite | 172,450 | 7,570 | 3,567 |
| Prosperity | 160,370 | 14,830 | 3,451 |
| Carl Junction | 162,080 | ..... | 3,242 |
| Central City | 157,380 | 12,980 | 2,871 |
| Reeds | 148,040 | ..... | 2,665 |
| Badger | 108,480 | ..... | 1,860 |
| Springfield | 66,000 | 66,000 | 3,135 |
| Diamond | 58,050 | ..... | 945 |
| Total, the week | 8,916,740 | 1,540,910 | $202,517 |
| Total, 19 weeks | 180,535,160 | 21,295,450 | $3,619,359 |

### Average Prices of Metals per lb., New York.

| | Tin. | | Lead. | | Spelter. | |
|---|---|---|---|---|---|---|
| Month. | 1903. | 1902. | 1903. | 1902. | 1903. | 1902. |
| January | 28.33 | 23.54 | 4.075 | 4.000 | 4.865 | 4.27 |
| February | 29.43 | 24.07 | 4.075 | 4.075 | 5.043 | 4.15 |
| March | 30.15 | 26.32 | 4.442 | 4.075 | 5.349 | 4.28 |
| April | 29.81 | 27.77 | 4.567 | 4.075 | 5.550 | 4.37 |
| May | .... | 29.85 | .... | 4.075 | .... | 4.47 |
| June | .... | 29.36 | .... | 4.075 | .... | 4.96 |
| July | .... | 28.38 | .... | 4.075 | .... | 5.27 |
| August | .... | 28.23 | .... | 4.075 | .... | 5.44 |
| September | .... | 26.60 | .... | 4.075 | .... | 5.49 |
| October | .... | 26.07 | .... | 4.075 | .... | 5.38 |
| November | .... | 25.68 | .... | 4.075 | .... | 5.18 |
| December | .... | 25.68 | .... | 4.075 | .... | 4.78 |
| Year | .... | 26.79 | .... | 4.069 | .... | 4.84 |

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.; for March, 5.174c.; for April, 5.375c.

### Average Prices of Copper.

| | New York | | | | London | |
|---|---|---|---|---|---|---|
| | Electrolytic. | | Lake. | | Standard. | |
| Month. | 1903. | 1902. | 1903. | 1902. | 1903. | 1902. |
| January | 12.159 | 11.063 | 12.361 | 11.322 | 53.52 | 48.43 |
| February | 12.778 | 12.173 | 12.901 | 12.378 | 57.34 | 55.16 |
| March | 14.416 | 11.882 | 14.572 | 12.188 | 63.85 | 53.39 |
| April | 14.454 | 11.618 | 14.642 | 11.986 | 61.72 | 52.79 |
| May | ..... | 11.856 | ..... | 12.226 | .... | 54.06 |
| June | ..... | 12.110 | ..... | 12.360 | .... | 53.95 |
| July | ..... | 11.771 | ..... | 11.923 | .... | 52.89 |
| August | ..... | 11.404 | ..... | 11.649 | .... | 51.96 |
| September | ..... | 11.480 | ..... | 11.760 | .... | 52.68 |
| October | ..... | 11.449 | ..... | 11.722 | .... | 53.18 |
| November | ..... | 11.288 | ..... | 11.533 | .... | 51.08 |
| December | ..... | 11.430 | ..... | 11.599 | .... | 50.96 |
| Year | ..... | 11.628 | ..... | 11.887 | .... | 53.46 |

**New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.**

### Average Prices of Silver, per ounce Troy.

| Month. | 1903. London. Pence. | 1903. N. Y. Cents. | 1902. London. Pence. | 1902. N. Y. Cents. | 1901. London. Pence. | 1901. N. Y. Cents. |
|---|---|---|---|---|---|---|
| January | 21.98 | 47.57 | 25.62 | 55.56 | 28.97 | 62.82 |
| February | 22.11 | 47.89 | 25.41 | 55.09 | 28.13 | 61.06 |
| March | 22.49 | 48.72 | 25.00 | 54.23 | 27.04 | 60.63 |
| April | 23.38 | 50.56 | 24.34 | 52.72 | 27.30 | 59.29 |
| May | .... | .... | 23.71 | 51.31 | 27.43 | 59.64 |
| June | .... | .... | 24.17 | 52.36 | 27.42 | 59.57 |
| July | .... | .... | 24.38 | 52.88 | 26.96 | 58.46 |
| August | .... | .... | 24.23 | 52.52 | 26.94 | 58.37 |
| September | .... | .... | 23.88 | 51.52 | 26.95 | 58.26 |
| October | .... | .... | 23.40 | 50.57 | 26.62 | 57.59 |
| November | .... | .... | 22.70 | 49.07 | 26.12 | 56.64 |
| December | .... | .... | 22.21 | 48.03 | 25.46 | 55.10 |
| Year | .... | .... | 24.09 | 52.16 | 27.11 | 58.95 |

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

### DIVIDENDS.

| Name of Company. | Date. | Per Share. | Total. | Total to Date. |
|---|---|---|---|---|
| †Amalgamated Copper | May 25 | .50 | $769,430 | $21,195,540 |
| Bartolome de Medina, Mex. | May 30 | .63 | 1,260 | 70,518 |
| Camp Bird, Colo. | May 25 | .15 | 123,000 | 455,100 |
| *Cinco Senores, Mex. | May 30 | 4.20 | 8,400 | 695,135 |
| Greene Con., Mex. | May 25 | .20 | 144,000 | 652,000 |
| *Home Oil, Cal. | May 20 | .07½ | 7,500 | 487,500 |
| International Nickel, pf., | May 26 | 4.00 | 360,000 | 360,000 |
| §Lehigh Coal & Nav. | May 27 | 1.00 | 286,933 | 20,382,053 |
| *Mines Co. of Am. | May 20 | .01¼ | 25,000 | 150,000 |
| *N. Y. & Hond. Rosario | May 15 | .10 | 15,000 | 1,925,000 |
| *Peerless Oil, Cal. | June 1 | .14 | 12,880 | 113,520 |
| *San Rafael, aviador, Mex. | May 20 | 6.72 | 8,064 | ..... |
| *San Rafael, aviador, Mex. | May 20 | 1.68 | 2,016 | ..... |
| *Soledad, Mex. | May 20 | 4.20 | 4,032 | 235,432 |
| Sorpressa, Mex. | May 20 | 2.10 | 2,016 | 189,505 |
| †Standard Con., Cal. | May 21 | .10 | 17,839 | 4,142,492 |
| *S'ta Gert. y An., Mex. | May 25 | .42 | 12,096 | 2,714,664 |
| *Standard, Ida. | May 20 | .05 | 25,000 | 2,845,000 |
| †U. S. Steel, common | June 9 | 1.00 | 5,083,025 | 45,726,552 |
| †Va.-Car. Chem., com. | June 1 | 1.25 | 349,805 | 3,678,869 |

* Monthly. † Quarterly.

### ASSESSMENTS.

| Name of Company. | Location. No. | Delinq. | Sale. | Amt. |
|---|---|---|---|---|
| Century | Utah .. | Apr. 19 | May 18 | .10 |
| Champion | Cal. .. | May 16 | ..... | .25 |
| Chollar | Nev. 62 | May 21 | June 11 | .10 |
| Confidence | Nev. 39 | May 19 | June 8 | .20 |
| Con. Cal. & Va. | Nev. .. | June 2 | June 25 | .25 |
| Con. St. Gothard | Cal. .. | June 1 | ..... | .05 |
| Fauna Oil | Cal. .. | May 25 | ..... | .03 |
| Golden Channel Drift | Cal. 3 | May 23 | June 20 | .01 |
| Grape Vine Canyon | Cal. .. | June 8 | ..... | .05 |
| Grizzly | Cal. .. | May 25 | ..... | .10 |
| Hale & Norcross | Nev. 12 | Apr. 30 | May 28 | .10 |
| Jubilee | Cal. .. | June 8 | ..... | .05 |
| Justice | Nev. .. | June 8 | June 27 | .10 |
| Kentucky Con. | Nev. 17 | May 6 | May 20 | .05 |
| Marina Marsicano | Cal. 35 | May 25 | June 15 | .05 |
| Morgan | Cal. .. | June 16 | ..... | .05 |
| Morning Star | Nev. .. | May 1 | May 21 | .00½ |
| National Con. | Cal. 17 | May 4 | May 30 | .05 |
| New Montezuma | Cal. | May 16 | ..... | .02 |
| Potosi | Nev. 66 | May 14 | June 4 | .10 |
| Santa Cruz Lime | Cal. .. | May 4 | May 25 | 75.00 |
| Seg. Belcher & Mides. | Nev. .. | May 5 | May 25 | .05 |
| Sheep Ranch | Cal. .. | May 23 | ..... | .40 |
| Sierra Nevada | Nev. 129 | May 19 | June 8 | .10 |
| Silver Shield | Utah 4 | Apr. 28 | May 15 | .02 |
| William Tell Con. | Cal. .. | May 9 | ..... | .001½ |
| Willietta | Cal. 6 | June 4 | July 2 | .01 |
| Yellow Jacket | Nev. .. | Apr. 30 | June 5 | .15 |

# STOCK QUOTATIONS.

## NEW YORK.

| Company and Location. | par val | May 6. H. | May 6. L. | May 7. H. | May 7. L. | May 8. H. | May 8. L. | May 9. H. | May 9. L. | May 11. H. | May 11. L. | May 12. H. | May 12. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acacia, Colo. | $1 | ..... | ..... | ..... | ..... | .08 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,000 |
| Alice, Mont. | 25 | ..... | ..... | .35 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 40 |
| Alta, Nev. | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .04 | ..... | ..... | ..... | 1,000 |
| Amalgamated c., Mont | 100 | 65⅛ | 64⅝ | 66⅛ | 65⅛ | 67¼ | 66⅛ | 67¼ | 66 | 67⅛ | 66¼ | 67 | 65⅝ | 176450 |
| †Anaconda c. Mont. | 25 | ..... | ..... | 105½ | 105 | 107¼ | 105 | 107 | 105 | 106¾ | ..... | ..... | ..... | 3,000 |
| Anaconda Gold, Colo. | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Argentum, J., Colo. | 2 | ..... | ..... | ..... | ..... | ..... | ..... | .02 | ..... | .02 | ..... | ..... | ..... | 2,000 |
| Belcher, Nev. | 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .51 | ..... | ..... | 200 |
| Best & Belcher, Nev | 3 | ..... | ..... | 1.75 | ..... | ..... | ..... | ..... | ..... | 1.70 | ..... | ..... | ..... | 200 |
| Breece, Colo. | 25 | .28 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |
| Brunswick, Cal. | 1 | ..... | ..... | ..... | ..... | .04½ | ..... | .04½ | ..... | .04½ | ..... | ..... | ..... | 670 |
| Caledonia, Nev. | 2½ | ..... | ..... | 1.90 | ..... | ..... | ..... | ..... | ..... | ..... | 1.75 | ..... | ..... | 250 |
| Chollar, Nev. | 3 | .34 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 500 |
| Comstock T., s., Nev. | 2 | .08½ | ..... | .08½ | ..... | ..... | ..... | .07 | ..... | ..... | ..... | ..... | ..... | 2,400 |
| Comst T Bonds | 100 | .06 | ..... | ..... | ..... | ..... | ..... | .08 | ..... | ..... | ..... | .08 | ..... | 5,000 |
| Con. Cal. & Va., g.s. Nev | 2½ | 1.25 | ..... | 1.25 | 1.20 | 1.20 | ..... | ..... | ..... | 1.25 | ..... | ..... | ..... | 1,001 |
| Cons. Imperial, Colo. | 1 | ..... | ..... | .02 | ..... | ..... | ..... | ..... | ..... | ..... | .04 | ..... | ..... | 2,000 |
| cripple Creek c., Colo. | 1 | .05½ | ..... | ..... | ..... | ..... | ..... | .05 | ..... | ..... | ..... | ..... | ..... | 2,000 |
| Daly, Utah. | 20 | 2.25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 40 |
| Elkton g., Colo. | 1 | ..... | ..... | .40 | .39 | ..... | ..... | .40 | ..... | ..... | .40 | ..... | ..... | 2,500 |
| El Paso, Colo. | 1 | .60 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .58 | ..... | ..... | ..... | 400 |
| Greene Con., c., Mex. | 10 | 22¾ | 22⅜ | 23 | 22¾ | 23 | ..... | 23 | 22¾ | 22⅜ | 22¼ | 22¼ | 22⅛ | 6,120 |
| Homestake, S. Dak. | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Isabella, g., Colo. | 1 | .19 | ..... | ..... | ..... | .18½ | ..... | .19 | .18 | .19 | ..... | ..... | ..... | 3,100 |
| Julia, Nev. | 1 | ..... | ..... | .04 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 600 |
| Justice, Nev. | 1 | ..... | ..... | ..... | ..... | .12 | .11 | ..... | ..... | ..... | ..... | ..... | ..... | 600 |
| Mexican, Nev. | 3 | ..... | ..... | ..... | ..... | ..... | ..... | .93 | ..... | .80 | ..... | ..... | ..... | 700 |
| Mollie Gibson, Colo. | 5 | ..... | ..... | .07½ | ..... | .07½ | ..... | ..... | ..... | .07½ | ..... | ..... | ..... | 1,800 |
| Moon-Anchor, Colo. | 5 | ..... | ..... | ..... | ..... | .09 | ..... | ..... | ..... | ..... | .08½ | ..... | ..... | 1,000 |
| Occidental, Nev. | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .45 | ..... | ..... | 100 |
| Ontario, Utah. | 100 | 6.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 50 |
| Ophir, s., Nev. | 1 | 1.00 | ..... | 1.65 | ..... | 1.70 | 1.60 | ..... | ..... | 1.50 | ..... | 1.60 | ..... | 1,000 |
| Portland, Colo. | 10 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.45 | ..... | ..... | ..... | 100 |
| Potosi, Nev. | 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .28 | ..... | 300 |
| Quicksilver, Cal. | 100 | ..... | ..... | ..... | ..... | 2.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 10 |
| Sierra Nevada, Nev. | 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .70 | ..... | ..... | ..... | 500 |
| Silver Hill, Nev. | 1 | ..... | ..... | ..... | ..... | .86 | .85 | ..... | ..... | .90 | ..... | ..... | ..... | 500 |
| Small Hopes, Colo. | 20 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .45 | ..... | ..... | ..... | 200 |
| Standard, Cal. | 10 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3.00 | ..... | ..... | ..... | 50 |
| Tenn. c., Tenn. | 25 | 28¼ | 28½ | 28¾ | 28½ | 29 | 28½ | 29¼ | 29 | 28⅝ | 28⅛ | 28⅝ | ..... | 3,600 |
| Union Con., Nev. | 2½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .87 | .86 | ..... | ..... | 300 |
| Union Cop., N. C. | 10 | 2⅜ | 2 | 2 | ..... | ..... | ..... | ..... | ..... | 2¼ | ..... | 2 | ..... | 1,610 |
| Utah Con., Nev. | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| White Knob, g. s., Ida | 100 | 13½ | 12½ | 14¼ | 14 | 15 | 14¼ | 15¼ | 15 | 16 | 15½ | 17¼ | 16 | 9,205 |
| Yellow Jacket, Nev. | 3 | .42 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 200 |

† Ex-Dividend. Total sales 231,695 shares.

## BOSTON, MASS.*

| Name of Company. | par val | Shares listed. | May 6. H. | May 6. L. | May 7. H. | May 7. L. | May 8. H. | May 8. L. | May 9. H. | May 9. L. | May 11. H. | May 11. L. | May 12. H. | May 12. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adventure Con., c. | $25 | 100,000 | 9¼ | 9 | ..... | ..... | ..... | ..... | ..... | ..... | 9 | ..... | 8¾ | ..... | 505 |
| Aetna | 5 | 100,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .75 | ..... | ..... | ..... | 200 |
| Allouez | 25 | 59,511 | 7¼ | 7 | 7¼ | 7 | 7¼ | 7⅛ | 7¼ | ..... | 7⅛ | 7 | 7 | ..... | 2,826 |
| Amalgamated, c. | 100 | 1,538,879 | 65⅝ | 64¼ | 66¾ | 65 | †67¼ | 65⅝ | †67¼ | 66¼ | †67 | 66¼ | 66⅞ | 65⅜ | 29,785 |
| Am. Z. L. & Sm. | 25 | 60,000 | ..... | ..... | ..... | ..... | 11 | 10¾ | 11¼ | ..... | 11⅜ | 11¼ | 12¼ | 10¾ | 1,810 |
| Anaconda, c. | 25 | 1,200,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 200 |
| Arcadian, c. | 25 | 150,000 | 3¾ | 3⅝ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Arnold | 25 | 60,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .50 | ..... | ..... | 100 |
| Atlantic, c. | 25 | 100,000 | 12 | ..... | ..... | ..... | ..... | ..... | 11¾ | ..... | 11⅞ | ..... | ..... | ..... | 250 |
| Bingham Con., g. s. | 50 | 150,000 | 31 | ..... | 30¾ | 30½ | 31 | 30¼ | 31 | ..... | 31⅜ | 31 | 30¾ | ..... | 840 |
| British Columbia. | 5 | 256,000 | 5¼ | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 250 |
| Cal. & Hecla, c. | 25 | 100,000 | ..... | ..... | 526 | 523 | 523 | ..... | 526 | ..... | 525 | ..... | 525 | ..... | 69 |
| Catalpa | 10 | 300,000 | ..... | ..... | ..... | ..... | .08 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |
| Centennial, c. | 25 | 90,000 | ..... | ..... | 26 | ..... | 26 | 25½ | 26¾ | 26¾ | 26¼ | 25¾ | 26 | 25½ | 1,110 |
| Central Oil | 25 | 60,000 | 7 | 6⅞ | ..... | ..... | ..... | ..... | 6¾ | ..... | 7 | ..... | ..... | ..... | 455 |
| Con. Mercur, g. | 5 | 1,000,000 | 1⅛ | ..... | 1⅛ | 1⅛ | ..... | ..... | 1⅛ | ..... | 1⅛ | 1⅛ | 1⅛ | ..... | 2,205 |
| Continental Zinc | 25 | 22,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Copper Range Con. | 100 | 285,000 | 64¾ | 64¼ | 65⅝ | 64¼ | 66 | 64¼ | 66¼ | 64¾ | 65¾ | 65 | 65⅛ | 63⅞ | 9,593 |
| Crescent | 10 | 300,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .06 | ..... | ..... | ..... | 325 |
| Daly-West., g. s. | 20 | 180,000 | 48 | ..... | 48½ | 48 | 48½ | ..... | †48 | ..... | †48 | 47¾ | ..... | ..... | 1,015 |
| Dominion Coal. | 100 | 150,000 | 100½ | 100½ | 109 | 108 | ..... | ..... | ..... | ..... | ..... | ..... | 108¾ | 106 | 1,340 |
| Dominion Coal, pf. | 100 | 30,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Dominion I & S. | 100 | 100,000 | 30¼ | 29½ | 29⅝ | 28¼ | ..... | ..... | ..... | ..... | 28¾ | ..... | 28 | ..... | 1,285 |
| Elm River. | 12 | 100,000 | 4½ | 4 | ..... | ..... | ..... | ..... | 4 | ..... | 4½ | 4 | ..... | ..... | 610 |
| Franklin, c. | 25 | 100,000 | 10¼ | ..... | 11 | ..... | ..... | ..... | ..... | ..... | 10¾ | ..... | 10½ | ..... | 175 |
| Granby | 10 | 1,338,303 | 5 | 4¾ | ..... | ..... | 5 | 4⅝ | 4¾ | ..... | 5 | 4⅞ | 5 | ..... | 3,650 |
| Guanajuato, Con. | 5 | 385,000 | 2¼ | 2 | ..... | ..... | 2¼ | 2 | 2 | ..... | 2 | ..... | 2½ | 2 | 1,070 |
| Isle Royale Con., c. | 25 | 385,000 | ..... | ..... | ..... | ..... | ..... | ..... | 11¾ | 11 | 10½ | ..... | ..... | ..... | 120 |
| Mass Con., c. | 25 | 100,000 | 10¼ | ..... | 10¾ | 9¼ | 10¾ | ..... | ..... | ..... | ..... | ..... | 9½ | ..... | 120 |
| Mayflower, c. | 25 | 100,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 | ..... | 10 |
| Michigan, c. | 25 | 100,000 | 8½ | ..... | ..... | ..... | 8½ | ..... | 8½ | ..... | 8¾ | 8¼ | 8¼ | 8 | 1,035 |
| Mohawk, c. | 25 | 100,000 | 52¼ | 51¾ | 52¾ | 50 | 52 | ..... | 52¼ | 52 | 52 | 51¾ | 52¼ | ..... | 1,356 |
| Mont. Coal & Coke. | 25 | 300,000 | 6¾ | ..... | 6¾ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 6¾ | ..... | 710 |
| Mont'l & Boston, c. | 5 | 570,000 | 1⅝ | 1¾ | ..... | ..... | ..... | ..... | 1¾ | ..... | ..... | ..... | 1⅛ | ..... | 650 |
| National. | 7 | 100,000 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |
| Old Colony, c. | 25 | 100,000 | ..... | ..... | 1¾ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 16 |
| Old Dominion, c. | 25 | 150,000 | 18¼ | 17¾ | 18¾ | ..... | ..... | ..... | ..... | ..... | 18 | ..... | 18 | ..... | 510 |
| Osceola, c. | 25 | 96,150 | 66 | ..... | 67 | ..... | 68¼ | 66¼ | ..... | ..... | 67¼ | 66¾ | 67 | ..... | 683 |
| Parrot, s. c. | 10 | 229,850 | ..... | ..... | ..... | ..... | 28 | ..... | 28¼ | ..... | 28⅛ | 28 | 28 | ..... | 300 |
| Phoenix Con., c. | 25 | 100,000 | 16 | ..... | 16 | ..... | 16 | ..... | 6 | ..... | 16 | ..... | ..... | ..... | 1,150 |
| Quincy, c. | 25 | 100,000 | ..... | ..... | 114 | 113 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 15 |
| Rhode Island, c. | 25 | 100,000 | 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |
| Santa Fe, g. c. | 10 | 250,000 | 2 | ..... | 2¼ | ..... | 2¼ | ..... | ..... | ..... | 2¼ | ..... | 2¼ | ..... | 750 |
| Shannon, c. | 10 | 188,153 | 14¼ | 14 | 14 | ..... | 14¾ | 14 | 14⅛ | 14 | 15 | 14 | 14 | ..... | 3,509 |
| Tamarack, c. | 25 | 60,000 | 145 | ..... | ..... | ..... | 141 | ..... | 143 | 140 | 141 | 140 | 140 | ..... | 346 |
| Trimountain | 25 | 100,000 | ..... | ..... | ..... | ..... | ..... | ..... | 91¾ | 91 | ..... | ..... | ..... | ..... | 150 |
| Trinity, c. | 25 | 100,000 | 9 | ..... | 9¼ | 9 | ..... | ..... | ..... | ..... | ..... | ..... | 9 | 8¾ | 475 |
| United Copper. | 100 | 450,000 | ..... | ..... | 20 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5 |
| United States, g. | 25 | 419,000 | ..... | ..... | ..... | ..... | 25 | 24½ | ..... | ..... | 24¾ | 24¾ | 24¾ | 24½ | 1,850 |
| U. S. Coal & Oil. | 25 | 240,000 | 14¾ | 14½ | 14½ | ..... | 14¾ | ..... | 14½ | ..... | ..... | ..... | 14¾ | ..... | 535 |
| Utah Con., g. | 5 | 300,000 | 29¾ | 29½ | 29¾ | 29½ | 29¾ | 29¾ | 30 | 29¾ | 29¾ | 29¼ | 29¾ | 29¼ | 2,828 |
| Victoria, c. | 25 | 100,000 | 5¾ | 5½ | 6¼ | 6 | ..... | ..... | ..... | ..... | ..... | ..... | 5¾ | ..... | 178 |
| Washington | 25 | 60,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Winona, c. | 25 | 100,000 | 12¼ | 12 | 12½ | 12¼ | 12⅜ | 12¼ | 12⅜ | 12⅛ | 12⅜ | 12¼ | 12¼ | 12¼ | 2,812 |
| Wolverine, c. | 25 | 60,000 | 71 | ..... | 72¾ | 72 | 71¾ | ..... | ..... | ..... | 71 | ..... | 71 | ..... | 291 |
| Wyandot | 25 | 100,000 | ..... | ..... | ..... | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |

* Boston Stock Exchange. † Ex Dividend. Total sales, 80,531 shares.

## COAL, IRON AND INDUSTRIAL STOCKS.*

| Name of Company. | Par val | May 6. H. | May 6. L. | May 7. H. | May 7. L. | May 8. H. | May 8. L. | May 9. H. | May 9. L. | May 11. H. | May 11. L. | May 12. H. | May 12. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Allis-Chalmers, U. S. | 100 | ..... | ..... | 16¾ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 17 | ..... | 272 |
| Allis-Chalm's, pf, U.S. | 100 | 84 | ..... | ..... | ..... | 84 | ..... | 83 | ..... | ..... | ..... | ..... | ..... | 100 |
| Am. Agr. Chem., U.S. | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Am. Agr. Chem. pf, U.S. | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Am. Sm. & Ref., U.S. | 100 | 50⅜ | ..... | 51 | 50 | 50⅝ | 50¼ | 50¼ | 50⅛ | 50¼ | 49⅜ | 50⅜ | 50¼ | 8,015 |
| Am. Sm. & Ref. pf, U.S. | 100 | 95¼ | 95¼ | 95⅝ | 95½ | 95⅝ | 95⅜ | 95⅜ | ..... | 95⅝ | 95¼ | 95¼ | 95⅜ | 3,800 |
| Am. Steel & Fdy., U.S. | 100 | 15⅜ | ..... | 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 14¾ | 14 | 1,500 |
| Am. S. & Fdy. pf., U.S. | 100 | 60¼ | ..... | 60 | ..... | ..... | ..... | ..... | ..... | ..... | 59½ | ..... | ..... | 22 |
| Col. Fuel & I., Colo. | 100 | 64½ | ..... | 64¼ | 61¾ | 62⅜ | 61¼ | 63¼ | 63 | 65¼ | 62¾ | 66¾ | 65¼ | 10,340 |
| Col. & H. C. & I., Colo. | 100 | 20 | 19¾ | ..... | ..... | ..... | ..... | 15¾ | ..... | ..... | ..... | 19¼ | ..... | 600 |
| †Crucible Steel, U. S. | 100 | 18½ | 18⅜ | 18½ | ..... | 18¼ | ..... | 18 | ..... | 18⅜ | ..... | 18⅝ | 18 | 1,300 |
| †Crucible Steel, pf, U S | 100 | 83¾ | ..... | 83⅜ | 83⅛ | 83¼ | ..... | 83¼ | 83 | 83⅜ | 83 | 82¾ | ..... | 774 |
| †Mong. R. Coal, Pa. | 100 | 10⅜ | ..... | ..... | ..... | 10⅜ | ..... | ..... | ..... | ..... | ..... | 10½ | ..... | 545 |
| †Mong. R. Coal pf, Pa | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 40 | 39¾ | 159 |
| National Lead, U.S. | 100 | 22½ | 20 | 20 | 19⅝ | 20½ | 20¼ | 21 | ..... | 21 | 20¼ | 20 | ..... | 13,736 |
| National Lead pf, U.S. | 100 | 90⅛ | 88⅛ | 88⅞ | ..... | 89¼ | ..... | ..... | ..... | 88⅝ | ..... | 88¾ | ..... | 1,011 |
| †Phila Nat. Gas | 100 | 35⅜ | ..... | ..... | ..... | ..... | ..... | 45 | ..... | ..... | ..... | 45¼ | 44¾ | 930 |
| †Phila Nat. Gas, pf. | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| †Pittsburg Coal, Pa. | 100 | 29⅞ | 29⅛ | 29¾ | ..... | ..... | ..... | ..... | ..... | 29⅜ | 29⅛ | 29⅛ | 29 | 29¾ | 29⅜ | 8,689 |
| †Pittsburg Coal pf, Pa | 100 | 89 | 88¼ | 88½ | ..... | ..... | ..... | ..... | ..... | 88⅜ | 88¼ | 88½ | 88¼ | 88¾ | 88¼ | 823 |
| Republic I. & S., U.S. | 100 | 19¾ | ..... | 19¼ | 19 | ..... | ..... | ..... | ..... | ..... | ..... | 19 | ..... | 19 | 18⅝ | 1,300 |
| Republic I. & S., pf, U.S. | 100 | 78¾ | ..... | 78¾ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | ..... | ..... | ..... | 600 |
| Sloss-Shef S. & I., Ala. | 100 | 62 | ..... | 61 | 60 | 58½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 40 | 39¾ | 650 |
| Sloss-Shef S. & I. pf, Ala. | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 91½ | 90¼ | 200 |
| Standard Oil, U.S. | 100 | ..... | ..... | 684 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8 |
| Tenn. C. I. & R. R., Ala. | 100 | 64¾ | 64¾ | 64¾ | 64 | 64 | 63 | 63 | 62¾ | 63 | 61½ | 63⅝ | 62¼ | 8,420 |
| U. S. Red & Ref., U. S. | 100 | 30 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 32 | 31½ | 400 |
| U. S. Red & R. pf., U.S. | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| U. S. Steel Corp., U.S. | 100 | 35⅜ | 35⅛ | 35½ | 35¼ | 35⅜ | 35 | 35¼ | 35 | 35½ | 34⅝ | 35 | 34½ | 40,111 |
| U. S. Steel Corp. pf, U.S. | 100 | 85 | 84¾ | 84¾ | 84⅜ | 84¾ | 84¼ | 84⅜ | 84¼ | 84⅜ | 83¾ | 84¼ | 83⅜ | 32,623 |
| Va.-Car Chem., U.S. | 100 | 63¼ | 63⅛ | 63⅜ | 63¼ | 63⅜ | ..... | ..... | ..... | 62¾ | 62¼ | 62¾ | 62¼ | 2,686 |
| Va.-Car Chem. pf, U.S. | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 124⅝ | ..... | ..... | ..... | 50 |
| Va. I. C. & Coke, U. S. | 100 | ..... | ..... | 33 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |

* New York Stock Exchange. † Pittsburg Stock Exchange. ‡Ex-Dividend. Total sales, 148,814 shares.

## COLORADO SPRINGS, COLO.*

| Name of Company. | Par val | May 4. H. | May 4. L. | May 5. H. | May 5. L. | May 6. H. | May 6. L. | May 7. H. | May 7. L. | May 8. H. | May 8. L. | May 9. H. | May 9. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acacia | $1 | .08¾ | ..... | .08¾ | .08¾ | .08¾ | .08⅝ | .08¾ | .08⅝ | .08¾ | .08⅝ | .08¾ | .08⅜ | 3,000 |
| Am. Con. | 1 | .03 | .02¾ | .02 | ..... | .03 | .02¾ | .03 | .02¾ | .03 | .02¾ | .03 | ..... | ..... |
| Anaconda | 1 | .15 | .14 | 14¾ | 14 | 14 | ..... | 14 | ..... | 14 | ..... | 14 | ..... | 500 |
| Ben Hur | 1 | .02¾ | ..... | .03 | .02 | .02 | ..... | .02 | ..... | .02 | ..... | .02 | ..... | 6,000 |
| Blue Bell | 1 | ..... | .04½ | .04½ | ..... | .02 | ..... | .04½ | ..... | .03 | ..... | .05½ | ..... | ..... |
| C. C. & M. | 1 | .02¼ | .02¼ | .02¼ | .02¼ | .02¼ | .02¼ | .02¼ | .02 | .02¼ | .02 | .02¼ | .02 | 2,000 |
| C. K. & N. | 1 | .19¾ | ..... | .20 | .19¼ | .19¾ | .19 | .20 | .19 | .05½ | ..... | .19¾ | .19 | 2,000 |
| C. C. Con. | 1 | .04¾ | ..... | .05 | .04¾ | .05 | .04¼ | .05½ | .04 | .19¾ | .19 | .05 | .04¼ | 6,000 |
| Coriolanus | 1 | .03¾ | .03 | .03 | ..... | .03 | ..... | .02½ | ..... | .04¾ | ..... | .03 | ..... | ..... |
| Des Moines | 1 | .03½ | .02¾ | .03½ | .02¾ | .03¼ | .02¾ | .03½ | .03 | .03½ | .02¾ | .03 | .02¾ | 2,000 |
| Dr. Jack Pot. | 1 | ..... | .08 | .09 | ..... | .09 | ..... | .08 | ..... | .10 | .08 | .09 | .08 | 8 |
| Elkton Con. | 1 | .37 | ..... | .37¼ | .37 | .37¼ | .37⅛ | .37⅜ | .37⅛ | .38⅛ | .37½ | .38½ | .37⅜ | 6,000 |
| El Paso | 1 | .60 | .58¾ | .59½ | .58¾ | .59⅞ | .58¾ | .60 | .58¾ | .60 | .58¾ | .60 | .59 | 2,500 |
| Fannie Rawlings | 1 | .05 | .03¾ | .05 | .03¾ | .05 | .03¾ | .05 | .03½ | .05 | .03¾ | .05 | .03¼ | ..... |
| Findley | 1 | .16 | .12 | .15 | .12 | .15 | .12 | .15 | .13½ | .15 | .13 | .16 | .13 | ..... |
| Gold King | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Gold Dollar Con. | 1 | .05½ | .05¾ | .05¾ | .05½ | .05½ | .05¾ | .05½ | .05¾ | .05¾ | .05½ | .05¾ | .05¾ | 22,000 |
| Golden Cycle. | 1 | .77 | .75 | ..... | ..... | .79 | .77¾ | .78¾ | .77 | .78¾ | .76 | .78 | .77¾ | 1,000 |
| Golden Fleece | 1 | ..... | ..... | .11 | .05 | .11 | .05 | .10 | .05 | .10 | .05 | .11 | .05 | ..... |
| Gould. | 1 | .03½ | .03¼ | .03½ | .03¼ | .04 | .03¼ | .03¼ | .03¼ | .03¼ | .03¼ | .03¼ | .03¼ | 2,000 |
| Hart | 1 | ..... | .02 | .04 | .02¾ | .02 | ..... | .02 | ..... | .02 | ..... | .02 | ..... | ..... |
| Isabella | 1 | .17¼ | .16¾ | .17¼ | .16¾ | .17½ | .16¾ | .17¼ | .16¾ | .17 | .16¾ | .17¼ | .16¾ | 2,000 |
| Jack Pot. | 1 | .10 | .08 | .09 | .08 | .09 | ..... | .09 | ..... | .10 | .08 | .10 | ..... | 2,000 |
| Last Dollar. | 1 | .50 | ..... | .50 | ..... | .60 | .30 | .50 | .30 | .50 | .30 | ..... | ..... | ..... |
| Lexington. | 1 | .04¾ | .04½ | .07 | .05¼ | .04¾ | .04¼ | .04¾ | .04 | .04½ | .04¼ | .04½ | .04¼ | 6,000 |
| Little Puck. | 1 | .03¼ | .03 | .03¼ | .02½ | .03¼ | .02¾ | .03½ | .02¼ | .03½ | .02¾ | .03¾ | .03¼ | ..... |
| Mollie Gibson | 1 | .07 | .05 | ..... | ..... | .07½ | .05¼ | .06¾ | .05½ | .07 | .05½ | .07 | .05½ | ..... |
| Moon Anchor | 1 | .08¼ | .07¼ | .08½ | .05¾ | .08¼ | .07½ | .08 | .07¾ | .08¼ | .07¾ | .08 | .08 | ..... |
| New Haven. | 1 | .02¾ | .02¾ | .02¾ | .02¾ | .02¾ | .02¼ | .02¾ | .02¾ | .02¾ | .02¾ | .02¾ | .02¾ | ..... |
| Pharmacist. | 1 | .04½ | ..... | .04½ | .04 | .04 | ..

# STOCK QUOTATIONS.

## MEXICO*. May 1.

| Name of Company | Shares Issued. | Last div'd | Prices. Bid. | Prices. Ask. |
|---|---|---|---|---|
| **Durango.** | | | | |
| Cerro Mun. de Penoles | 2,500 | $50.00 | $4,000 | $4,500 |
| San Andres de la Sierra | 200 | | 1,000 | |
| **Guanajuato.** | | | | |
| Augustias, Pozos | 2,400 | 5.00 | 80 | 85 |
| Cinco Senores y An., aviadoras | 2,000 | 15.00 | 210 | 225 |
| Cinco Senores y An., aviada | 400 | 10.00 | 180 | 190 |
| Providencia, SanJuan de la Luz | 6,000 | 2.00 | 140 | 150 |
| Queensland y Australia | 300 | | 60 | 70 |
| **Guerrero.** | | | | |
| Garduno y Anexas | 7,200 | | 35 | 50 |
| **Hidalgo.** | | | | |
| Amistad y Concordia | 9,600 | 6.90 | 71 | 72 |
| Carmen, aviada | 1,100 | | 110 | 120 |
| Guadalupe Fresnillo mill | 1,000 | | 250 | 300 |
| Guadalupe Fresnillo Mine | 1,400 | | 70 | 80 |
| La Blanca, aviadora | 1,536 | | 1,100 | 1,150 |
| La Blanca, aviada | 768 | | 850 | 880 |
| La Reina y An., aviadora | 5,600 | | 21 | 23 |
| Maravillas y An., aviador | 1,680 | | | |
| Maravillas el Lobo | 1,000 | | 130 | 180 |
| Palma y An., aviador | 1,800 | | | 12 |
| Real del Monte | 2,554 | 10.00 | 650 | 700 |
| Santa Ana y An., aviadora | 1,800 | | 30 | 35 |
| Santa Ana y An., aviada | 600 | | 25 | 30 |
| Sta. Gertrudis y An., aviadas | 9,600 | | | 7½ |
| Sta. Gertrudis y An., aviadora | 28,800 | 2.00 | 80¼ | 81 |
| Santo Tomas Apostol aviadoras | 5,100 | | 1 | 3 |
| San Felipe de Jesus, aviadora | 3,600 | | 30 | 33 |
| San Felipe de Jesus, aviada | 1,200 | | 10 | |
| San Rafael y An., Trompillo | 1,200 | 12.00 | 1,130 | 1,150 |
| San Rafael y An., aviada | 1,200 | $8.00 | $390 | $400 |
| Soledad, aviada | 960 | 8.00 | 360 | 370 |
| Sorpresa, aviada | 960 | 8.00 | 305 | 310 |
| **Mexico.** | | | | |
| Alacran | 2,400 | | 30 | 40 |
| Buen Despacho | 3,000 | | 60 | 70 |
| Dos Estrellas | 3,000 | 30.00 | 2,120 | 2,140 |
| La Esperanza (El Oro) | 3,000 | 10.00 | 1,170 | 1,200 |
| La Reforma, aviadores | 2,000 | | 55 | 60 |
| Santa Ana, Esperanza | 2,400 | | 70 | 90 |
| **Michoacan.** | | | | |
| Luz de Borda, aviadora | 3,000 | | 55 | 60 |
| Luz de Borda, aviada | 1,000 | | 10 | 14 |
| **San Luis Potosi.** | | | | |
| Concepcion y An | 3,000 | | 90 | 100 |
| El Barreno, aviadora | 2,000 | 2.00 | 38 | 43 |
| Sta. Maria de la Paz | 2,400 | 10.00 | 715 | 720 |
| San Diego y Annexas | 2,400 | 4.00 | 18 | 20 |
| **Zacatecas.** | | | | |
| Asturiana y An | 2,500 | | 59 | 60 |
| Candelaria y Pinos | 2,500 | 10.00 | 310 | 320 |
| Esperanza y An | 2,400 | | 30 | 40 |
| Lourdes | 2,500 | | 25 | 35 |
| Luz de Minillas, pagadoras | 2,000 | | 20 | 30 |
| San Carlos y Annexas | 2,500 | 20.00 | 145 | 155 |
| Sta. Maria de Gaud. | 2,500 | 10.00 | 55 | 65 |
| **Miscellaneous.** | | | | |
| Bartolome de Medina | 2,000 | 1.50 | 70 | 75 |
| Guadalupe Hacienda | 10,000 | 6.00 | | |
| La Luz Hac. (Pachuca) | 3,750 | | 290 | 295 |
| La Reina (Chihuahua) | 192 | | | |
| Naica (Chihuahua) | 100 | | 10,000 | 13,000 |
| Natividad (Oaxaca) aviadora | 1,800 | 10.00 | 700 | 900 |
| Natividad (Oaxaca) aviadas | 600 | 4.00 | 700 | 900 |
| San Francisco Hac. | 6,000 | 1.00 | 40 | 45 |
| Santa Ana Huantla Morelos | 4,000 | | | |
| Union Hacienda | 3,000 | 5.00 | 220 | 240 |

*Values are in Mexican currency.

## SAN FRANCISCO (*By Telegraph*).

| Name of Company. | May. 11. | May. 12. | Name of Company. | May. 11. | May. 12. |
|---|---|---|---|---|---|
| Belcher | .50 | .48 | Justice | .07 | .07 |
| Best & Belcher | 1.55 | 1.65 | Mexican | .91 | .69 |
| Caledonia | 1.60 | 1.45 | Occidental Con | .41 | .49 |
| Challenge Con | .41 | .37 | Ophir | 1.60 | 1.60 |
| Chollar | .28 | .26 | Overman | .44 | .41 |
| Confidence | 1.00 | 1.00 | Potosi | .30 | .29 |
| Con. Cal. & Va | 1.35 | 1.35 | Savage | .23 | .22 |
| Con. Imperial | .03 | .02 | Sierra Nevada | .68 | .65 |
| Crown Point | .26 | .26 | Union Con | .86 | .85 |
| Gould & Curry | .45 | .44 | Utah Con | .57 | .51 |
| Hale & Norcross | .74 | .73 | Yellow Jacket | .40 | .49 |

## SALT LAKE CITY.* May 9.

| Name of Company | Shares. | Par Val | High | Low | Sales. | Name of Company. | Shares. | Par Val | High | Low | Sales. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alax | 300,000 | $10 | .25 | .25 | 900 | May Day | 400,000 | 0.25 | .18¾ | .17½ | 15,700 |
| Ben Butler | 500,000 | 1 | .15 | .10½ | 30,100 | M. Washington | 300,000 | .... | .03½ | .02½ | 9,500 |
| California | 300,000 | 1 | .16 | .13½ | 8,150 | N. Y. Bonanza | .... | .... | .28½ | .22½ | 12,500 |
| Con. Mercur | 1,000,000 | 5 | 1 37½ | 1.33 | 3,870 | Naildriver | .... | .... | 1.76 | 1.74 | 900 |
| Creole | .... | .... | .60 | .60 | 100 | Sacramento | 1,000,000 | 5 | .27 | .25¾ | 25,200 |
| Crown Point | .... | .... | 1.52½ | 1.52 | 600 | Silver Shield | .... | .... | .09½ | .09 | 2,000 |
| Daly-Judge | 300,000 | 1 | 9.10 | 9.00 | 686 | Star Con | 500,000 | 1 | .21¼ | .14½ | 13,100 |
| Daly-West | 300,000 | 20 | 47.85 | 47.10 | 685 | S. Swansea | 150,000 | 1 | .23 | .22 | 1,800 |
| Ely & B Pencil | .... | .... | .... | .... | .... | Uncle Sam | 500,000 | 1 | .25 | .24 | 2,800 |
| Grand Central | 250 000 | 1 | 5 00 | 4.87½ | 1,800 | Utah | 100,000 | 10 | .77½ | .76 | 2,400 |
| L. Mammoth | 150,000 | 1 | 1.13 | .68 | 90,300 | Victor | 500,000 | 1 | .23 | .19½ | 2,850 |
| Little Bell | .... | .... | 2 42½ | 2.42½ | 100 | Wabash | .... | .... | .26¾ | .26½ | 2,000 |
| Mammoth | 400,000 | 25 | 1 12½ | 1.05 | 700 | Yankee Con | 500,000 | 1 | .39 | .31½ | 7,700 |

All mines are in Utah. *By our Special Correspondent. Total sales, 236,315 shares.

## ST. LOUIS, MO.* May 9.

| Name. | Capital Stock. | Par Val. | Prices. Bid. | Prices. Ask. | Name. | Capital Stock. | Par Val. | Prices. Bid. | Prices. Ask. |
|---|---|---|---|---|---|---|---|---|---|
| Adv. Nettie, Colo | $3,000,000 | $10 | $0.50 | $0.70 | Columbia Lead, Mo. | $500,000 | 10 | $11.00 | 15.00 |
| Catherine Lead, Mo. | 500,000 | 10 | 1.80 | 3.00 | Con. Coal, Ill. | 500,000 | 100 | 21.75 | 23.00 |
| Central Coal & C | 1,875,000 | 100 | 64.50 | 65.75 | Doe Run Lead Co. | 1,500,000 | 100 | 105.00 | 111.00 |
| Central C. & C., pf. | 1,875 000 | 100 | 75 00 | 77 00 | Granite Bimet., Mt. | 1,000,000 | 10 | 0 83 | 0.90 |
| Central Lead, Mo | 1,000,000 | 10 | 130.00 | 140.00 | St Joe Lead, Mo | 6,000,000 | 10 | 15 00 | 17.00 |

*From our Special Correspondent.

## PHILADELPHIA, PA.*

| Name and Location of Company. | par val | May 6. H. | May 6. L. | May 7. H. | May 7. L. | May 8. H. | May 8. L. | May 9. H. | May 9. L. | May 11. H. | May 11. L. | May 12. H. | May 12. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am. Alkali, Mich | $50 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Am. Cement | 10 | 8 | .... | .... | .... | 8 | .... | .... | .... | 8 | .... | .... | .... | 248 |
| Cambria Iron, Pa | 50 | 47⅜ | .... | .... | .... | .... | .... | .... | .... | 47½ | .... | .... | .... | 22 |
| Cambria Steel, Pa | 50 | 24⅜ | 24⅛ | 24⅜ | .... | 24¼ | .... | 24⅜ | 24⅛ | 24⅜ | .... | 24⅜ | .... | 1,082 |
| Penn. Steel, pfd | 100 | 93 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 7 |
| Susq. I. & S., Pa | 5 | 2¼ | .... | .... | 2⅛ | .... | .... | 2¼ | 2⅛ | .... | .... | .... | .... | 350 |
| United Gas I., Pa | 50 | 108¾ | 107¾ | 108¾ | 108 | 108¾ | *104¼ | 95¼ | 95 | 95¾ | 94 | 94¼ | 93½ | 7,978 |
| Warwick I. & Steel | 10 | .... | .... | 5½ | .... | .... | .... | .... | .... | 5½ | .... | .... | .... | 402 |

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 10,087 shares.
†Ex-Allotments.

## LONDON. April 28.

| Name and Country of Company | Shares Issued. | Par value. £. s. d. | Latest dividend. Amt. s. d. | Latest dividend. Date | Quotations. Buyers. £. s. d. | Quotations. Sellers. £. s. d. |
|---|---|---|---|---|---|---|
| Alaska-Treadwell, g., Alaska | 200,000 | 5 0 0 | 3 0 | Apr., 1903 | 4 7 6 | 4 12 6 |
| Anaconda, c. s., Montana | 1,200,000 | 5 0 0 | 2 0 | May, 1903 | 5 5 0 | 5 7 6 |
| Arizona, c., Def., ord | 63,444 | 1 0 0 | 5 6 | Feb., 1903 | 7 15 0 | 8 5 0 |
| Arizona, pref., ord | 316,350 | 1 0 0 | 5 6 | Feb., 1903 | 8 0 0 | 8 5 0 |
| Camp Bird, g., Colorado | 738,000 | 1 0 0 | 0 7½ | May, 1903 | 1 17 0 | 1 18 0 |
| Copiapo, c., Chile | 112,500 | 2 0 0 | 6 10½ | Mar., 1903 | 2 2 6 | 2 7 6 |
| De Lamar, g. s., Idaho | 80,000 | 1 0 0 | 2 0 | Nov., 1902 | 11 3 | 13 9 |
| Enterprise, g., British Col | 165,000 | 1 0 0 | | | 2 6 | 7 6 |
| El Oro, g., Mexico | 1,000,000 | 1 0 0 | 1 6 | Dec., 1902 | 1 11 3 | 1 13 9 |
| Frontino & Bolivia, g., Colombia | 128,662 | 1 0 0 | 3 0 | July, 1901 | 17 6 | 1 0 0 |
| Le Roi, g., British Col | 200,000 | 5 0 0 | 5 0 | Nov., 1899 | 1 8 9 | 1 11 3 |
| Le Roi No. 2, g., British Col | 120,000 | 5 0 0 | 5 0 | May, 1902 | 1 1 3 | 1 3 9 |
| Mesquital, Mexico | 250,000 | 2 0 | 3 | Feb., 1903 | 3 6 | 4 6 |
| Montana, g. s., Montana | 657,128 | 1 0 0 | 6 | April, 1899 | 2 3 | 2 9 |
| Mountain, c., Cal | 250,000 | 5 0 0 | 4 0 | Nov., 1902 | 3 5 0 | 3 10 0 |
| Stratton's Independence, Colorado | 1,000,007 | 1 0 0 | 6 | April, 1902 | 10 0 | 10 6 |
| St. John del Rey., g., Brazil | 546,265 | 1 0 0 | 6 | Dec., 1902 | 16 0 | 17 0 |
| Utah Con., g. c., (Highland Boy), Utah | 300,000 | 1 0 0 | 7 0 | Jan., 1903 | 5 10 0 | 6 0 0 |
| Ymir, g., British Col | 200,000 | 1 0 0 | 1 0 | Mar., 1902 | 10 0 | 12 6 |
| European: | | | | | | |
| Linares, l., Spain | 15,000 | 3 0 0 | 9 | Oct., 1902 | 3 5 0 | 3 15 0 |
| Mason & Barry, c., sul., Port'g'l | 185,172 | 1 0 0 | 11 0 | May, 1903 | 3 17 6 | 4 2 6 |
| Rio Tinto, c., Spain | 325,000 | 5 0 0 | 27 6 | Apr., 1903 | 49 12 6 | 49 17 6 |
| Rio Tinto, pref., Spain | 325,000 | 5 0 0 | 2 6 | Apr., 1903 | 6 0 0 | 6 5 0 |
| Tharsis, c., Spain | 625,000 | 2 0 0 | 6 0 | Apr., 1903 | 4 7 6 | 4 12 6 |
| Australia and New Zealand: | | | | | | |
| Assoc. Gold Mines, W. Australia | 495,388 | 1 0 0 | 1 6 | Jan., 1900 | 1 18 9 | 2 1 3 |
| Briseis, Tin, Tasmania | 600,000 | 1 0 0 | | | 7 0 | 8 0 |
| Broken Hill Pr'p., s., N. S. Wales | 960,000 | 8 0 | 1 0 | Feb., 1903 | 1 14 0 | 1 15 0 |
| Cosmopolitan Prop., W. Australia | 385,000 | 1 0 0 | 6 | July, 1902 | 17 6 | 18 0 |
| Golden Horse Shoe, W. Australia | 300,000 | 5 0 0 | 6 0 | Apr., 1903 | 10 12 6 | 10 15 0 |
| Great Fingall Con., W. Australia | 250,000 | 1 0 0 | 5 0 | Sept., 1902 | 7 12 6 | 7 15 0 |
| Great Bo'd'r Pr'p., W. Australia | 1,750,000 | 0 2 0 | 0 | Mar., 1903 | 1 2 3 | 1 2 9 |
| Ivanhoe Gold Corp., W. Australia | 200,000 | 5 0 0 | 4 0 | Jan., 1903 | 9 18 9 | 10 1 3 |
| Kalgurli, g., W. Australia | 120,000 | 1 0 0 | 2 6 | Apr., 1903 | 4 6 3 | 4 8 0 |
| Lake View Cons., g., W. Australia | 250,000 | 1 0 0 | rts. | Aug., 1902 | 2 11 3 | 2 13 9 |
| Mt. Lyell M. & R. I., c., Tasmania | 275,000 | 3 0 0 | 1 0 | Apr., 1903 | 2 12 6 | 2 15 0 |
| Mt. Morgan, g., Queensland | 1,000,000 | 1 0 0 | 3 | May, 1903 | 3 17 6 | 4 2 6 |
| Waihi, g., New Zealand | 497,412 | 1 0 0 | 2 6 | Mar., 1903 | 5 1 3 | 5 3 9 |
| Indian: | | | | | | |
| Champion Reef, g., Colar Fields | 473,000 | 10 0 | 4 6 | May., 1903 | 7 8 9 | 7 11 3 |
| Mysore Gold, Colar Fields | 630,000 | 10 0 | 5 0 | Mar., 1903 | 7 3 9 | 7 6 3 |
| Nundydroog, g., Colar Fields | 484,000 | 10 0 | 1 6 | Mar., 1903 | 2 6 3 | 2 8 9 |
| Ooregum, g., Colar Fields | 343,000 | 10 0 | 1 6 | Apr., 1903 | 1 15 0 | 1 17 6 |
| Ooregum, pref., g., Colar Fields | 240,000 | 10 0 | 1 6 | Apr., 1903 | 2 5 0 | 2 7 6 |
| African: | | | | | | |
| Angelo, g, Transvaal | 600,000 | 1 0 0 | 6 0 | Feb., 1903 | 7 3 9 | 7 6 3 |
| Bonanza, g., Transvaal | 200,000 | 1 0 0 | 12 0 | Feb., 1903 | 4 0 0 | 4 5 0 |
| British South Africa | 4,430,019 | 1 0 0 | rts. | May, 1898 | 3 2 6 | 3 5 0 |
| Cape Copper, S. Africa | 300,000 | 2 0 0 | 8 0 | Jan., 1902 | 2 17 6 | 3 0 0 |
| Cape Copper, pref., S. Africa | 75,000 | 2 0 0 | 2 3 | Jan., 1903 | 3 2 6 | 3 7 6 |
| City and Sub'n (New), g., Transvaal | 340,000 | 4 0 0 | 8 0 | Aug., 1899 | 6 10 0 | 6 12 6 |
| Crown Reef, g., Transvaal | 120,000 | 1 0 0 | 11 0 | May., 1903 | 17 15 0 | 18 5 0 |
| De Beers Con., d., pref., Cape Colony | 800,000 | 2 10 0 | 10 0 | Mar., 1903 | 19 10 0 | 19 12 6 |
| De Beers Con., def | 1,000,000 | 2 10 0 | 12 6 | Mar., 1903 | 21 16 3 | 21 18 9 |
| East Rand, Prop, Transvaal | 970,000 | 1 0 0 | rts. | May, 1902 | 8 5 0 | 8 6 3 |
| Ferreira g., Transvaal | 90,000 | 1 0 0 | 2 0 | May., 1903 | 22 5 0 | 22 15 0 |
| Geldenhuis Est., g., Transvaal | 200,000 | 1 0 0 | 5 0 | Feb., 1903 | 6 13 9 | 6 16 3 |
| Geduld, g., Transvaal | 400,000 | 1 0 0 | rts. | Mar., 1902 | 7 16 3 | 7 18 9 |
| Henry Nourse, g., Transvaal | 125,000 | 1 0 0 | 8 0 | Feb., 1903 | 9 5 0 | 9 10 0 |
| Jagersfontein, d., Orange F. S | 200,000 | 5 0 0 | 6 0 | Nov., 1899 | 29 0 0 | 29 5 0 |
| Jubilee, g., Transvaal | 50,000 | 1 0 0 | bonus. | Aug., 1902 | 5 2 6 | 5 7 6 |
| Jumpers, Transvaal | 100,000 | 1 0 0 | 5 0 | Aug., 1899 | 3 17 6 | 4 2 6 |
| Langlaagte Est., g., Transvaal | 470,000 | 1 0 0 | 3 0 | Sept., 1899 | 4 2 6 | 4 5 0 |
| May Con , g., Transvaal | 288,780 | 1 0 0 | 3 0 | Feb., 1903 | 4 8 9 | 4 11 3 |
| Meyer & Charlton, g., Transvaal | 100,000 | 1 0 0 | 3 0 | Feb., 1903 | 5 10 0 | 5 12 6 |
| Namaqua, c., Cape Colony | 94,331 | 2 0 0 | 2 0 | June, 1902 | 3 7 6 | 3 10 0 |
| Primrose (New), g., Transvaal | 325,000 | 1 0 0 | 2 0 | Feb., 1903 | 3 17 6 | 4 0 0 |
| Rand Mines, g., S. Africa | 1,795,956 | 5 0 | 4 0 | Aug., 1902 | 11 2 6 | 11 5 0 |
| Robinson, g., Transvaal | 750,000 | 5 0 0 | 6 0 | Feb., 1903 | 10 13 9 | 10 16 3 |
| Robinson Deep, g., Transvaal | 950,000 | 1 0 0 | 5 0 | May, 1899 | 5 5 0 | 5 7 6 |
| Rose Deep, Transvaal | 425,000 | 1 0 0 | 2 0 | Feb. 1903 | 9 0 0 | 9 5 0 |
| Salisbury, g., Transvaal | 100,000 | 1 0 0 | 2 0 | Mar., 1899 | 2 10 0 | 2 15 0 |
| Sheba, g., Transvaal | 1,075,000 | 1 0 0 | 6 | July, 1898 | 1 2 6 | 1 3 9 |
| Village Main Reef, Transvaal | 400,000 | 1 0 0 | 5 0 | Oct., 1902 | 8 15 0 | 9 0 0 |
| Wemmer, Transvaal | 80,000 | 1 0 0 | 10 0 | Jan., 1903 | 12 15 0 | 13 0 0 |

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

## LONDON. (*By Cable*).*

| Name of Company. | Apr. 28. £. | Apr. 28. s. | Apr. 28. d. | May 12. £. | May 12. s. | May 12. d. | Name of Company | Apr. 28. £. | Apr. 28. s. | Apr. 28. d. | May 12. £. | May 12. s. | May 12. d. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anaconda | 5 | 10 | 0 | 5 | 10 | 0 | Johannesburg Invest | 3 | 3 | 9 | 3 | 7 | 6 |
| British South Africa | 3 | 0 | 0 | 3 | 0 | 0 | Modderfontein | 10 | 12 | 6 | 10 | 6 | 3 |
| Camp Bird | 1 | 16 | 6 | 1 | 16 | 3 | Rand Mines | 10 | 17 | 6 | 10 | 13 | 9 |
| Con. Gold-Fields | 7 | 11 | 3 | 7 | 7 | 6 | Rio Tinto com | 49 | 5 | 0 | 50 | 15 | 0 |
| De Beers Con. def | 21 | 16 | 3 | 22 | 0 | 0 | Simmer & Jack | 1 | 11 | 3 | 1 | 10 | 7½ |
| East Rand | 8 | 6 | 0 | 8 | 14 | 4½ | Tomboy | 1 | 17 | 6 | 1 | 17 | 6 |
| El Oro, Mex | 1 | 13 | 1½ | 1 | 13 | 9 | | | | | | | |
| Jagersfontein | 29 | 0 | 0 | 29 | 2 | 6 | | | | | | | |

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

## PARIS. April 29.

| Name of Company. | Country. | Product. | Capital Stock. Francs. | Par value. Fr. | Latest divs. Fr. | Prices. Opening. Fr. | Prices. Closing. Fr. |
|---|---|---|---|---|---|---|---|
| Boleo | Lower Cal | Copper | | 500 | 176.00 | 1,470.00 | 1,430.00 |
| Champ d'Or | S. Africa | Gold | 3,375,000 | 25 | 3.75 | 22.25 | 22.25 |
| Fraser River | Brit. Col'mb. | Gold | 250,000 | 25 | | 6.50 | 6.50 |
| Huanchaca | Bolivia | Silver | 40,000,000 | 125 | 5.00 | 107.00 | 100.00 |
| Metaux, Cie. Fran. de | France | Metal dealers | 25,000,000 | 500 | 22.50 | 470.50 | 469.00 |
| Nickel | N. Caled'nia | Nickel | 15,000,000 | 250 | 22.50 | 473.50 | 476.00 |
| Sedalia & California | Calif., U. S. | Oil | 1,000,000 | 1 | 9.50 | 9.50 | 9.75 |
| Rebecca | Colo'do, U. S. | Gold | 5,000,000 | 25 | | 0.75 | 9.50 |
| Vielle Montagne | Belgium | Zinc | 9,000,000 | 30 | 30.00 | 651.00 | 659.0 |

## TORONTO, ONT.* May 9.

| Name of Company. | par val | Prices. High. | Prices. Low. | Sales. | Name of Company | Par val | Prices. High. | Prices. Low. | Sales. |
|---|---|---|---|---|---|---|---|---|---|
| Black Tail | $1 | .07 | .04 | ..... | Granby Smelter | $10 | 510 | 480 | ..... |
| Cariboo (Mc. K.) | 1 | .14 | .11 | ..... | Mountain Lion | 1 | .20 | .11 | ..... |
| Cariboo (Hyd.) | 1 | .75 | .... | ..... | North Star | 1 | .14 | .12 | 1,500 |
| Center Star | 1 | .31 | .28¼ | 1,020 | Nova Scotia Steel, com | 100 | 1 02½ | 1.00½ | ..... |
| Crows Nest, C | 100 | 4.03 | 3.90 | ..... | Payne | 1 | .19 | .17 | ..... |
| Dominion Coal, com | 100 | 1.11 | 1.08 | ..... | Rambler Cariboo | 1 | .40 | .35 | ..... |
| Dominion S. & I | 100 | .32 | .28¼ | ..... | Republic | 1 | .06½ | .03 | ..... |
| Dominion S. & I., pref. | 100 | 70 | 39 | ..... | St. Eugene | 1 | .45 | .35 | ..... |
| Fairview | 1 | .07 | .05¾ | ..... | Virtue | 1 | .08 | .06½ | ..... |
| Giant | 1 | .03½ | .02 | ..... | War Eagle Con | 1 | .16 | .12 | 1,000 |

*Standard Stock and Mining Exchange. Total sales 3,520 shares

# CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

| | Cust. | Meas. | Price. |
|---|---|---|---|
| **ABRASIVES—** | | | |
| Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF. | lb. | | $0.08 |
| Grains | " | | .10 |
| Corundum, N. C. | " | | .07@.10 |
| Chester, Mass. | " | | .04½@.05 |
| Barry's Bay, Ont. | " | | .07½@.09½ |
| Mont. car-lots, f.o.b., Chicago | " | | .07@.07½ |
| Crushed Steel, f.o.b. Pittsburg | " | | .05½ |
| Emery, Turkish flour in kegs | " | | .03½ |
| Grains, in kegs | " | | .05@.05½ |
| Naxos flour, in kegs | " | | .03½ |
| Grains, in kegs | " | | .05@.05½ |
| Chester flour, in kegs | " | | .03½ |
| Grains, in kegs | " | | .05@.05½ |
| Peekskill, f.o.b. Easton, Pa., flour, in kegs | " | | .01½ |
| Grains, in kegs | " | | .02½ |
| Crude, ex-ship N. Y.; Abbott (Turkey) | lg.ton | | 26.50@30.00 |
| Kuluk (Turkey) | " | | 22.00@24.00 |
| Naxos (Greek) h. gr. | " | | 26.00 |
| Garnet, as per quality | sh.ton | | 25.00@35.00 |
| Pumice Stone, Am. Powd | lb. | | .01⅝@.02 |
| Italian, powdered | " | | .01½ |
| Lump, per quality | " | | .04@.40 |
| Rottenstone, ground | " | | .02½@.04½ |
| Lump, per quality | " | | .06@.20 |
| Rouge, per quality | " | | .10@.30 |
| Steel Emery, f.o.b. Pittsburg. | " | | .07 |
| **ACIDS—** | | | |
| Boracic, crystals | " | | .10¾@.11 |
| Powdered | " | | .11¼@.11½ |
| Carbonic, liquid gas | " | | .12½ |
| Chromic, crude | " | | .20 |
| Hydrofluoric, 30% | " | | .03 |
| 48% | " | | .05 |
| 60% | " | | .11 |
| Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J. | " | | .06 |
| **ALCOHOL—Grain** | gal. | | 2.40@2.42½ |
| Refined wood 95@97% | " | | .60@.65 |
| Purified | " | | 1.20@1.50 |
| **ALUM—Lump** | 100 lbs. | | 1.75 |
| Ground | " | | 1.85 |
| Porous | " | | .80 |
| Powdered | " | | 3.00 |
| Chrome, com'l | " | | 2.75@3.00 |
| **ALUMINUM—** | | | |
| Nitrate | lb. | | 1.50 |
| Oxide, com'l, common | " | | .06½ |
| Best | " | | .20 |
| Pure | " | | .80 |
| Hydrated | 100 lbs. | | 2.60 |
| Sulphate, com'l | " | | 1.25@1.50 |
| **AMMONIA—** | | | |
| Aqua, 16° | lb. | | .03 |
| 18° | " | | .03¼ |
| 20° | " | | .03¾ |
| 26° | " | | .05½ |
| **AMMONIUM—** | | | |
| Carbonate, lump | " | | .07½ |
| Powdered | " | | .08¼ |
| Muriate | " | | .05⅝ |
| Lump | " | | .09 |
| Nitrate, white pure (99%) | " | | .12 |
| Phosphate, com'l | " | | .09 |
| Pure | " | | .12 |
| **ANTIMONY—Glass** | " | | .30@.40 |
| Needle, lump | " | | .05½@.06 |
| Powdered, ordinary | " | | .05¾@.07¼ |
| Oxide, com'l white, 95% | " | | .09½ |
| Com'l white, 95% | " | | .12 |
| Com'l gray | " | | .07 |
| Sulphuret, com'l | " | | .16 |
| **ARSENIC—White powd.** | " | | .03@.03⅛ |
| Red | " | | .06½@.06¾ |
| **ASPHALTUM—** | | | |
| Ventura, Cal. | sh.ton | | 32.00 |
| Cuban | lb. | | .01½@.03½ |
| Egyptian, crude | " | | .05½@.06 |
| Trinidad, refined | sh. ton | | 35.00 |
| San Valentino (Italian) | lg. ton | | 16.00 |
| Seyssel (French), mastic | sh. ton | | 21.00 |
| Gilsonite, Utah, ordinary | lb. | | .03 |
| Select | " | | .03¾ |
| **BARIUM—** | | | |
| Carb. Lump, 80@90% | sh.ton | | 25.00@27.50 |
| 92@98% | " | | 26.00@29.00 |
| Powdered, 80@90% | lb. | | .01¾@.02 |
| Chloride, com'l | 100lbs. | | 1.67½@1.76 |
| Chem. pure cryst | lb. | | .05 |
| Nitrate, powdered | " | | .05⅞ |
| **BARIUM** | Cust. | Meas. | Price. |
| Sulphate (Blanc Fixe) | lb. | | $0.01⅞ |
| **BARYTES—** | | | |
| Am. Crude, No. 1 | sh.ton | | 9.00 |
| Crude, No. 2 | " | | 8.00 |
| Crude, No. 3 | " | | 7.75 |
| Floated | " | | 18.25 |
| Foreign, gray | " | | 14.00 |
| Snow white | " | | 17.00 |
| Floated | " | | 18.75 |
| **BAUXITE—Ga. or Ala. Mines:** | | | |
| First Grade | lg.ton | | 5.50 |
| Second grade | " | | 4.75 |
| **BISMUTH—Subnitrate** | lb. | | 2.00 |
| Subcarbonate | " | | 2.25 |
| **BITUMEN—"B"** | " | | .03½ |
| "A" | " | | .05 |
| **BONE ASH** | " | | .02¼@.02½ |
| **BORAX** | " | | .07¼@.07½ |
| **BROMINE—Bulk.** | " | | .35 |
| **CADMIUM—Metallic** | " | | 1.40 |
| Sulphate | 100 lbs. | | 2.00@2.50 |
| **CALCIUM—Acetate, gray** | " | | 1.40 |
| " brown | " | | .95 |
| Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J. | sh.ton | | 70.00 |
| Carbonate, ppt. | lb. | | .05 |
| Chloride | 100 lbs. | | .70@.90 |
| **CEMENT—** | | | |
| Portland, Am., 400 lbs. | bbl. | | 2.00@2.15 |
| Foreign | " | | 1.95@2.50 |
| "Rosendale," 300 lbs | " | | .80 |
| Slag cement, imported | " | | 1.65 |
| **CERESINE—** | | | |
| Orange and Yellow | lb. | | .13 |
| White | " | | .14 |
| **CHALK—Lump, bulk** | Sh.ton | | 3.00 |
| Ppt. per quality | lb. | | .04¼@.05¼ |
| **CHLORINE—Liquid** | " | | .30 |
| Water | " | | .10 |
| **CHROME ORE—** | | | |
| (50% ch.) ex-ship N. Y. | lg.ton | | 24.75 |
| Bricks f.o.b. Pittsburg | M | | 175.00 |
| **CLAY, CHINA—Am. com., ex-dock, N. Y.** | lg.ton | | 8.25 |
| Am. best, ex-dock, N. Y. | " | | 9.25 |
| English, common | " | | 10.50 |
| Best grade | " | | 17.00 |
| Fire Clay, ordinary | sh.ton | | 4.25 |
| Best | " | | 6.00 |
| Slip Clay | " | | 5.00 |
| **COAL TAR PITCH** | gal. | | .08 |
| **COBALT—Carbonate** | lb. | | 1.75 |
| Nitrate | " | | 1.50 |
| Oxide—Black | " | | 2.26@2.30 |
| Gray | " | | 2.28@2.40 |
| Smalt, blue ordinary | " | | .06 |
| Best | " | | .20 |
| **COPPERAS—in bulk** | 100 lbs. | | .42½ |
| In bbls | " | | .47½ |
| **COPPER—Carbonate** | lb. | | .18@.19 |
| Chloride | " | | .25 |
| Nitrate, crystals | " | | .35 |
| Oxide, com'l | " | | .19 |
| **CRYOLITE** | " | | .06½ |
| **EXPLOSIVES—** | | | |
| Blasting powder, A | 25 lb. keg | | .65 |
| Blasting powder, B | " | | 1.40 |
| "Rackarock," A | lb. | | .25 |
| "Rackarock," B | " | | .18 |
| Judson R.R. powder | " | | .10 |
| Dynamite (20% nitro-glycerine) | " | | .13 |
| (30% nitro-glycerine) | " | | .14 |
| (40% nitro-glycerine) | " | | .15 |
| (50% nitro-glycerine) | " | | .16½ |
| (60% nitro-glycerine) | " | | .18 |
| (75% nitro-glycerine) | " | | .21 |
| Glycerine for ultro, (32-2-10° Be.) | " | | .13¼@.13⅞ |
| **FELDSPAR—Ground** | sh.ton | | 8.00@9.00 |
| **FLINT PEBBLES—Dan. Best.** | lg.ton | | 14.75 |
| French, Best | " | | 11.75 |
| **FLUORSPAR—** | | | |
| Am. lump, 1st grade | sh.ton | | 14.40 |
| 2d grade | " | | 13.90 |
| Gravel and crushed, 1st gr | " | | 13.40 |
| 2d grade | " | | 12.40 |
| Ground, 1st grade | " | | 17.90 |
| Ground, 2d grade | " | | 16.50 |
| Foreign, lump | " | | 8.00@12.00 |
| Ground | " | | 11.50@14.00 |
| **FULLER'S EARTH—** | 100 lbs. | | .80 |
| **GRAPHITE—Am. f.o.b. Providence, R. I., lump** | sh.ton | | $8.00 |
| Pulverized | " | | 30.00 |
| German, com. pulv. | lb. | | .01¼@.01½ |
| Best pulverized | " | | .01½@.02 |
| Ceylon, common pulv. | " | | .02¾@.03½ |
| Best pulverized | " | | .04@.08 |
| Italian, pulv | " | | .01¼ |
| **GYPSUM—Ground** | sh.ton | | 8.00@8.50 |
| Fertilizer | " | | 7.00 |
| Rock | lg.ton | | 4.00 |
| English and French | " | | 14.00@16.00 |
| **INFUSORIAL EARTH—Gr'd.** | | | |
| American best | " | | 20.00 |
| French | " | | 37.50 |
| German | " | | 40.00 |
| **IODINE—Crude** | 100 lbs. | | 2.45 |
| **IRON—Muriate** | lb. | | .05 |
| Nitrate, com'l | " | | .01¾ |
| True | " | | .04 |
| Oxide, pure copperas color. | " | | .05@.10 |
| Purple-brown | " | | .02 |
| Venetian red | " | | .01@.01½ |
| Scale | " | | .01@.03 |
| **KAOLIN—(See China Clay.)** | | | |
| **KRYOLITH—(See Cryolite.)** | | | |
| **LEAD—Acetate, white** | " | | .08¼@.08½ |
| Brown | " | | .06¼@.06½ |
| Nitrate, com'l | " | | .06½ |
| " gran. | " | | .08¼ |
| **LIME—Com., abt. 250 lbs.** | bbl. | | .75 |
| Finishing | " | | .95 |
| **MAGNESITE—Greece.** | | | |
| Crude (95%) | lg. ton | | 5.50@6.00 |
| Calcined | sh.ton | | 17.50@18.00 |
| Bricks best imp., f.o.b., N.Y. | M. | | 155.00 |
| " domes., per qual., f.o.b. Pittsburg | " | | 160.@200. |
| **MAGNESIUM—** | | | |
| Carbonate, light, fine pd. | lb. | | .05 |
| Blocks | " | | .07@.09 |
| Chloride, com'l | " | | .01¾ |
| Fused | " | | .20 |
| Nitrate | " | | .60 |
| Sulphate | 100 lbs. | | .75@.95 |
| **MANGANESE—Powdered,** 70@75% binoxide | lb. | | .01¼@.01½ |
| Crude pow'd. 75@85% binoxide | " | | .01½@.02¼ |
| 85@90% binoxide | " | | .02¼@.03¼ |
| 90@95% binoxide | " | | .03¼@.05½ |
| Carbonate | " | | .16@.20 |
| Chloride | " | | .04 |
| Ore, 50%, Foreign | unit | | .18@.19 |
| Domestic | " | | .30 |
| **MARBLE—Flour** | sh.ton | | 6.00@7.00 |
| **MERCURY—Bichloride** | lb. | | .77 |
| **MICA—N. Y. gr'nd, coarse** | sh.ton | | 33.00@38.00 |
| Fine | lb. | | .00⅞@.02 |
| Sheets, N. C., 2x4 in. | " | | .30 |
| 3x3 in. | " | | .80 |
| 3x4 in. | " | | 1.50 |
| 4x4 in. | " | | 2.00 |
| 6x6 in. | " | | 3.00 |
| **MINERAL WOOL—** | | | |
| Slag, ordinary | sh.ton | | 19.00 |
| Selected | " | | 25.00 |
| Rock, ordinary | " | | 32.00 |
| Selected | " | | 40.00 |
| **NICKEL Oxide, No. 1** | lb. | | 1.00 |
| No. 2 | " | | .60 |
| Sulphate | " | | .20@.21 |
| **OILS—Black, reduced 29 gr.:** | | | |
| 25@30, cold test | gal. | | .13@.13½ |
| 15, cold test | " | | .13½@.14 |
| Zero | " | | .18@.18½ |
| Summer | " | | .12½@.13 |
| Cylinder, dark steam ref. | " | | .14½@.15 |
| Dark, filtered | " | | .18½@.19 |
| Light, filtered | " | | .20½@.20 |
| Extra cold test | " | | .25@.31 |
| Gasoline, 86°@90° | " | | .16@.21 |
| Naphtha, crude, 68°@72° | bbl. | | 11.20 |
| "Stove" | gal. | | .14½ |
| Linseed, domestic raw | " | | .41@44 |
| Boiled | " | | .46 |
| Calcutta, raw | " | | .75 |
| **OZOKERITE** | lb. | | .11½ |
| **PAINTS AND COLORS—** | | | |
| Chrome green, common | " | | .03 |
| Pure | " | | .16 |
| Yellow, common | " | | .10¼ |
| Best | " | | .14 |
| Lampblack, com'l | " | | .04½ |
| Refined | " | | .07 |
| Litharge, Am. pow'd | " | | .05¾@.06 |
| English flake | " | | .08¼@.08½ |
| Glassmakers' | " | | .06½@.08¼ |
| **PAINTS AND COLORS—** | Cust. | Meas. | Price. |
| Metallic, brown | sh.ton | | $19.00 |
| Red | " | | 16.00 |
| Ocher, Am. common | " | | 9.25@10.00 |
| Best | " | | 21.25@25.00 |
| Dutch, washed | lb. | | .04 |
| French, washed | " | | .01½@.01⅝ |
| Orange mineral, Am. | " | | .08⅛@.08⅝ |
| Foreign, as to make | " | | .08½@.10 |
| Paris green, pure, bulk | " | | .22 |
| Red lead, American | " | | .06¼@.06½ |
| Foreign | " | | .06⅝@.06¾ |
| Turpentine, spirits | gal. | | .48½@.49 |
| White lead, Am., dry | lb. | | .05½@.05¾ |
| American, in oil | " | | .07@.07½ |
| Foreign, in oil | " | | .07@.07½ |
| Zinc, white, Am., ex dry | " | | .04⅝@.04¾ |
| Foreign, red seal, dry | " | | .06@.06⅛ |
| Green seal, dry | " | | .06½@.06¾ |
| **POTASH** | | | |
| Caustic, ordinary | " | | .04½@.04¾ |
| Elect. (90%) | " | | .06¼ |
| **POTASSIUM—** | | | |
| Bicarbonate cryst | " | | .08½ |
| Powdered or gran. | " | | .14 |
| Bichromate, Am. | " | | .08½@.08¾ |
| Scotch | " | | .08½@.09 |
| Bromide, bulk | " | | .22 |
| Carbonate (80@85%) | " | | .03½@.04 |
| Chlorate, powd. | " | | .07½@.07¾ |
| Crystals | " | | .07@.07¼ |
| Chromate | " | | .35 |
| Cyanide (98@99%) | " | | .20 |
| Kainit | lg.ton | | 9.30 |
| Manure salt, 20% | 100 lbs. | | .96 |
| D'le Manure Salt, 48@53% | " | | 1.12 |
| Muriate, 80@85% | " | | 1.83 |
| 95% | " | | 1.86 |
| Permanganate | lb. | | .09½@.09⅝ |
| Prussiate, yellow | " | | .13¼@.13½ |
| Red | " | | .34 |
| Sulphate, 90% | 100 lbs. | | 2.11 |
| 96% | " | | 2.14 |
| Sylvanit | unit | | .41 |
| **QUARTZ—(See Silica).** | | | |
| **SALT—N. Y. com. fine 280 lbs** | bbl. | | .72@1.18 |
| N. Y. agricultural | sh.ton | | 4.40 |
| **SALTPETRE—Crude** | 100 lbs. | | 3.50 |
| Refined | " | | 4.25@4.62½ |
| **SILICA—Best foreign** | lg.ton | | 10.00@11.00 |
| Ground quartz, ord. | sh.ton | | 6.00@8.00 |
| Best | " | | 12.00@13.00 |
| Lump quartz | " | | 2.50@4.00 |
| Glass sand | " | | 2.75 |
| **SILVER—Chloride** | oz. | | .65 |
| Nitrate Crystals | " | | .34½ |
| Oxide | " | | .85@1.10 |
| **SODIUM—** | | | |
| Bicarb., ordinary, f.o.b. w'ks | 100 lbs. | | 1.25 |
| Extra domes, f.o.b. w'ks | " | | 3.50 |
| Foreign, f.o.b. N. Y. | " | | 1.60 |
| Bichromate | lb. | | .06¼ |
| Carbonated ash, high test, in bags, f.o.b. works | 100 lbs. | | .75@.82½ |
| Foreign, f.o.b. N. Y. | " | | .90@.92½ |
| Caustic, 60@78%, f.o.b. w'ks | " | | 1.70@1.75 |
| Foreign, f.o.b. N. Y. | " | | 1.90@2.00 |
| Chlorate, com'l | " | | .07¼@.07⅝ |
| Hyposulphite, Am. | " | | 1.60@1.65 |
| German | " | | 1.70@1.90 |
| Nitrate, spot | " | | 2.05 |
| Shipments | " | | 1.95 |
| Peroxide | lb. | | .45 |
| Phosphate | " | | .02½@.02¼ |
| Prussiate | " | | .09¾ |
| Sal soda, f.o.b. works | 100 lbs. | | .55 |
| Foreign, f.o.b. N. Y. | " | | .67½ |
| Silicate, conc. | lb. | | .03 |
| Com'l | " | | .01 |
| Sulphate, com'l | 100 lbs. | | 82½ |
| Sulphide | lb. | | .01¼ |
| Sulphite crystals | " | | .02½ |
| **SULPHUR—Roll** | 100 lbs. | | 1.85 |
| Flour | " | | 1.90 |
| Flowers, sublimed | " | | 2.15 |
| **TALC—N. C., 1st grade** | sh.ton | | 18.00 |
| N. Y., Fibrous, best | " | | 10.20 |
| French, best | 100 lbs. | | 1.25 |
| Italian, best | " | | 1.62½ |
| **TAR—Regular** | bbl. | | 2.40 |
| Oil barrels | " | | 4.40 |
| **TIN—Crystals** | lb. | | .27 |
| Oxide | " | | .42 |
| **URANIUM—Oxide** | " | | 2.25@3.00 |
| **ZINC—Metallic, ch. pure** | " | | .07@.09½ |
| Carbonate, ppt. | " | | .05 |
| Chloride solution, com'l | " | | .02 |
| Chloride granular | " | | .04¼@.04½ |
| Dust | " | | .04⅝@.04¾ |
| Sulphate | " | | .02½@.02⅝ |

## THE RARE EARTHS.

| | | |
|---|---|---|
| **BORON—Nitrate** | lb. | $1.50 |
| **CALCIUM—Tungstate (Scheelite)** | " | .60 |
| **CERIUM—Nitrate** | " | 10.00 |
| **DIDYMIUM—Nitrate** | " | 35.00 |
| **ERBIUM—Nitrate** | " | 40.00 |
| **GLUCINUM—Nitrate** | " | 20.00 |
| **LANTHANUM—Nitrate** | " | 30.00 |
| **LITHIUM—Carbonate** | " | 1.50 |
| **LITHIUM—Nitrate** | oz. | .60 |
| **STRONTIUM—Nitrate** | lb. | .07⅛@.08⅛ |
| **THORIUM—Nitrate 49@50%.** | " | 4.50 |
| **URANIUM—Nitrate** | oz. | .25 |
| **YTTRIUM—Nitrate** | lb. | 40.00 |
| **ZIRCONIUM—Nitrate** | " | 8.00 |

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.